A NORMATIVE VIEW OF THE PRE-OVERHAUL PLANNING PROCESS

Michael Edward House

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

A NORMATIVE VIEW OF THE PRE-OVERHAUL
PLANNING PROCESS

by

Michael Edward House

September 1976

Thesis Advisor: M. D. Sovereign

Approved for public release; distribution unlimited.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A Normative View of the Pre-Overhaul Planning Process		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis September 1976
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Michael Edward House		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		12. REPORT DATE September 1976
		13. NUMBER OF PAGES 151
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Pre-Overhaul Planning
Shipyard overhaul
Maintenance planning
Maintenance management

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This paper derives from the author's understanding and appreciation of the importance of the various events in the Pre-Overhaul Planning Phase. This thesis describes the Pre-Overhaul Planning Process for a destroyer type ship scheduled for overhaul at a naval shipyard. The Pre-Overhaul Planning Process is then examined from a normative viewpoint which concurrently provides a basic framework for the decision maker to utilize in the detailed analysis of each component of the overhaul repair work package. In conduct-

20. (continued)

ing this detailed analysis, numerous tradeoffs are required between the overhaul objective, the constraints and the resources available to accomplish the overhaul repairs. The environment the decision-maker encounters in the Pre-Overhaul Planning Process is also described. By presenting how the Pre-Overhaul Planning System works, how it should work and the environment that must be contended with, this thesis will lead to an increased awareness of the requirements and the importance of Pre-Overhaul Planning.

A Normative View of the Pre-Overhaul Planning Process

by

Michael Edward House
Lieutenant, United States Navy
B.A., University of Montana, 1968

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
September 1976

ABSTRACT

This paper derives from the author's understanding and appreciation of the importance of the various events in the Pre-Overhaul Planning Phase. This thesis describes the Pre-Overhaul Planning Process for a destroyer type ship scheduled for overhaul at a naval shipyard. The Pre-Overhaul Planning Process is then examined from a normative viewpoint which concurrently provides a basic framework for the decision maker to utilize in the detailed analysis of each component of the overhaul repair work package. In conducting this detailed analysis, numerous tradeoffs are required between the overhaul objective, the constraints and the resources available to accomplish the overhaul repairs. The environment the decision-maker encounters in the Pre-Overhaul Planning Process is also described. By presenting how the Pre-Overhaul Planning System works, how it should work and the environment that must be contended with, this thesis will lead to an increased awareness of the requirements and the importance of Pre-Overhaul Planning.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

I. INTRODUCTION

A. OBJECTIVE

The primary objective of this paper is to examine the Pre-Overhaul Planning Process and propose certain modifications from a normative viewpoint.

The paper will provide a practical understanding and appreciation of the significance of the Pre-Overhaul Planning Process. In providing a perspective to all readers, regardless of activity or organization, the statements will be made as generalizations of experience from several ships rather than specifics covering each detail of the process for a particular overhaul.

B. INTRODUCTORY REMARKS

The author became familiar with the Pre-Overhaul Planning Process while serving on the staff of Commander, Cruiser-Destroyer Force, U. S. Atlantic Fleet as a Maintenance Representative, Jan 72 - Aug 74. He received during this period first-hand experience in coordinating the Pre-Overhaul Planning Process; including the scheduling of pre-overhaul tests and inspections (POT&I), the screening and authorization of the repair work packages, and subsequently monitoring the overhaul of the ships overhauling north of Norfolk, VA. The author was actively involved in the complex overhauls for the USS ALBANY (CG-10), USS BARNEY (DDG-6), USS FARRAGUT (DLG-6) (the first Atlantic Fleet

1200 psi improvement overhaul) and a number of regular overhauls and major restricted availabilities.

The basic resources required for an overhaul are unchanging; money, time, material, manpower and decision talent [1]. From the experience acquired as a Maintenance-Rep, it was apparent that with each COMCRUDESLANT overhaul during this period (Jan 72-Aug 74), the repair package required more time, more man-days, more money, more work and more materials than originally authorized. The reasons for this repair package growth can be traced, the author contends, as originating from the Pre-Overhaul Planning Process, as will be subsequently discussed in Chapter III. The author argues that this source of repair package growth has remained unchanged from the 1972-74 period to the present (1976). He believes this to be true as there has been no major changes or modifications to the methodologies that existed and were utilized in 1974, which would have corrected this problem of growth. He believes that the net result of this problem of repair package growth was a large variance between the planned and final overhaul costs.

This problem of overhaul repair package growth, originating from the Pre-Overhaul Planning Process, may be attributed to a combination of two factors. (1) The degree of accuracy and thoroughness employed in identifying and formulating the overhaul repair package. (2) The often large amount of repairs that are not originally authorized to be accomplished during the overhaul period. These unauthorized repairs have a significant affect by their tendency to migrate into the authorized repair

package. This effect causes the overhaul repair package to increase in cost. The growth experienced is often legitimate, mandatory work required to successfully complete the overhaul.

An obvious solution to the problem of this repair package growth during overhaul would be to minimize the amount of growth by authorizing more work for accomplishment and thus spending more money during the Pre-Overhaul Planning Process. In the case of the 600 psi DD, the overhaul repair package has increased from a FY 69 average of 1.1 million dollars to a FY 75 average of 4.4 million dollars. The average 1200 psi DDG FY 70 overhaul was 1.8 million dollars but by FY 75 had grown to 7.9 million dollars. The DE-1052 class overhaul has grown from a FY 74 average of 2.6 million dollars to a FY 75 average of 7.3 million dollars. These figures were the type commanders annual planning figures (APF), [2] and do not account for the effects of inflation. Yet the return or final costs increased from the annual planning figure (APF) by as much as 60 percent.

It is the author's contention, that merely increasing the APF has failed to minimize the growth problem. From this, one must logically conclude that the current and, in all likelihood, the future overhaul environment is one of more work identified than resources available to reduce the amount of total shipboard maintenance.

For any given surface ship currently scheduled for overhaul, the reasons today for the increasing amount of total shipboard maintenance

have remained essentially unchanged from the 1972-1974 period. Any list would likely include such considerations as;

(1) The post-Vietnam reduction of manning, loss of critical skills and loss of experienced shipboard leadership.

(2) The long-term effects of the high tempo of operations from the Vietnam War.

(3) The increasing age of the ships combined with increasing complexity of shipboard systems.

It is felt by the author that these types of problems have already had their impact upon shipboard level maintenance and are beyond the scope of this paper. Given this assumption, the objective will be to concentrate on the Pre-Overhaul Planning Process where the problem is one of how to improve the effectiveness of the process employed in "fixing" the ship.

Within the Pre-Overhaul Planning Process, the author believes the major problems to be:

(1) Failure to set realistic objectives in terms of what results are expected from the overhaul.

(2) The scope and magnitude of the required work to achieve the overhaul objectives are frequently not sufficiently well defined.

(3) The ship's operational schedule often is not conducive to the scheduling and execution of the pre-overhaul events.

(4) The ship's material condition is often unknown or uncertain to the type commander and the overhaul activity.

(5) Due to circumstances,[1] the date and overhaul site can be subject to change.

These types of problems were no more unique to the 1960's[2] than to the present. It is the author's opinion, that many of these problems, as previously listed, existed before the presently employed concept of overhaul. The problem encountered in the older overhaul methodologies in preparing, reviewing and screening of the ship's force work lists, conducting the various shipyard inspections (i.e, Electronics, Weapons, Machinery Hull, etc.) all required the same degree of participation with the same basic problems as encountered by the present overhaul system.

Based upon first-hand experience, the author feels that changes to improve the present Pre-Overhaul Planning Process have not been rapid nor dynamic, but can be best described as creeping incrementalism, as reflected by the slow response in minimizing the amount of overhaul repair package growth. On the positive side the momentum has been in the right direction. The author believes the presently employed methodologies to be perfectly capable, with modifications, of effectively dealing with these problems.

C. LIMITATIONS ON SCOPE OF EXAMINATION

The scope of this paper will only examine the pre-overhaul planning period for the development of the tycom repair package for a destroyer type ship. The reasons for this "narrow" perspective are: (1) Excluding

carriers and submarines, a modern DDG/DLG represents the most complex and most difficult to deal with, in terms of the overhaul planning process (2) the problems encountered with any given overhaul are not confined to one period of time, but are evident at any stage in the overhaul cycle. The author feels that the Pre-Overhaul Planning Process represents one area where changes can yield immediate benefits and is thus the arena on which to concentrate on first.

This paper is organized such that the reader who has knowledge of the subject area may chose to skip Chapter Two, which deals with the organization and structure of the Pre-Overhaul Planning Process. Chapter Three presents a normative selection decision process which provides a basic framework that can be employed in defining the overhaul repair work package. Chapter Four discusses the major environmental elements that must be considered as peripheral considerations in the Normative Selection Decision Process presented in Chapter Three. The conclusions are presented in Chapter Five. Footnotes are presented at the end of each chapter, and generally reflect a "real world flavor."

FOOTNOTES

CHAPTER I

[1] These circumstances range from operational schedule changes by CNO, the Fleet Commander or Type Commander to shipyard work scheduling. Additionally such factors as politics and fiscal considerations, do play a definite role in the process of overhaul scheduling. Appendix A contains additional information on overhaul scheduling.

[2] Prior to 1959, Navy overhauls were rigidly fund limited. Overhaul expenditures from that era bear little, if any, relationship to the ship's actual material condition. The effort today is to be "thorough" in the sense that no "a priori" budgetary ceiling is imposed, and the objective is to achieve a safe and reliable ship during the post overhaul operating cycle.

II. THE PRESENT PRE-OVERHAUL SYSTEM

The objective of the Pre-Overhaul Planning Process is to identify (1) the overhaul repair package in terms of required repairs to ensure the ship will be a safe and reliable fleet asset over its post-overhaul operating cycle and (2) the cost of accomplishing these required repairs.

Prior to discussing the Pre-Overhaul Planning Process a brief summary of the general Navy maintenance strategy and the system used in determining an overhaul repair work package will be presented.

A. THE NAVY MAINTENANCE STRATEGY

The Navy utilizes a cyclic, three-echelon maintenance strategy [3]. The three-maintenance echelons will be described subsequently. The cyclic maintenance requirements are specified by:

(1) The 3-M system (Maintenance and Material Management System) composed of two sub-systems, the first of which is PMS (Planned Maintenance System), which identifies the cyclic planned preventative maintenance part of which is scheduled to be accomplished during a ship's overhaul period. The second subsystem is the MDCS (Maintenance Data Collection System) which provides the documentation of the results of the shipboard corrective maintenance actions. The information from the MDCS is used from the highest levels of management down to the shipboard level.

(2) The time per quarter which a ship is assigned by the type commander's operating schedule for a tender or IMA (Intermediate Maintenance Activity) availability.

(3) The depot level maintenance cycle which assigns some classes, such as aircraft carriers, a scheduled shipyard restricted availability (SRA) between scheduled overhauls.

(4) The overhaul schedule which is promulgated by the Office of Chief of Naval Operations, by which ships are scheduled for overhaul.

(5) Emergent, unplanned maintenance, caused by equipment casualties or other unplanned maintenance. The correction of this type of unscheduled work is generally accomplished by scheduling an emergent availability at the appropriate repair activity.

The three maintenance echelons are formed by depot level activities (Naval Shipyards), Intermediate Maintenance Activities (IMA) and the shipboard level maintenance activity (ship force).

Depot level activities accomplish (1) the repair and modernization of ships, (2) equipment overhaul or restoration of equipment components for return into the supply system for redistribution and later installation by one of the three maintenance echelons.

The eight naval shipyards and three ship repair facilities receive approximately 70% of the total depot level overhaul work with the remaining 30% going to qualified (via the Master Ship Repair Contract) civilian yards, of which there are approximately 190.

The intermediate level maintenance is that maintenance which is performed by Navy personnel in tenders, repair ships, fleet support bases or Fleet Maintenance Assistance Groups (FMAG).

The type of maintenance or repair performed by IMA's is generally one of repair, manufacture, fabrication or calibration of parts, components for hull, mechanical and electrical, electronics and weapons systems that are beyond the capability of ship force maintenance personnel to accomplish. This includes such items as the installation of selected Title D and Title F Alterations and ORDALTS (Ordnance Alteration). The IMAs also have the capability of major component exchanges of equipments refurbished by depot-level maintenance activities.

An ASROC launcher exchange by a tender, would be an example of this type of capability. The IMA's also provide technical assistance to fleet units.

The ships force maintenance is that corrective and preventive maintenance which is a combination of equipment operation, condition monitoring and repair, ranging from simple PMS checks to a component change-out and in some cases major in-place equipment repairs or overhaul.

B. CATEGORIES OF MAINTENANCE PERIODS

The discussion of categories of maintenance periods will exclude new construction ships and will focus on those "older" fleet units.

For simplicity the categories of maintenance periods will be presented by maintenance echelon.

At the depot level two categories [4] of overhaul warrant definition, (1) the complex overhaul (COH) is one, which because of manpower, money, time constraints and/or because of the complexity or interrelationships of the various ship sub-systems affected by the work packages, requires coordinated and extensive management of both the planning and industrial phases of the overhaul, (2) the regular overhaul (ROH) is an availability for the accomplishment of general repairs and alterations at a naval shipyard (or civilian shipyard).

Additional categories of depot level maintenance periods where work may be accomplished on a ship are:

(1) SRA - Scheduled Restricted Availability, scheduled between overhauls, for some classes of ships (carriers) to receive additional depot level maintenance.

(2) RAV - Restricted Availability - scheduled by the Type Commander to effect major emergent or mission restrictive repairs requiring depot-level maintenance. Additionally an RAV may be scheduled to install selected ship alterations, such as the Navy Distillate Conversion, or LAMPS.

(3) TAV - Technical availability, assigned by the Type Commander to repair, fabricate, manufacture or overhaul specific equipment or components for an afloat unit.

At the Intermediate Maintenance Level (IMA) there are three categories of availabilities.

(1) Regular Availability, scheduled by the Tycom for a maintenance period with an IMA activity for those repairs within tender capabilities, as discussed previously.

(2) Concurrent Availability, assigned by Tycom for ships undergoing a lengthy RAV or undergoing an overhaul.

(3) Parent IMA Availability, by which a ship is assigned by the Tycom to specific parent maintenance activity to enable the ship to have access to a maintenance activity (when the ship is not assigned an availability) to correct emergent high-priority work only.

Shipboard maintenance and maintenance planning must be performed considering the ships operational commitments, or during a Tycom scheduled upkeep period. The upkeep period is a period assigned the ship for the "uninterrupted" accomplishment of work by the ships force.

C. THE OVERHAUL WORK PACKAGE

The overhaul work package is composed of two types of work, ship alterations and the repair work package.

A ship alteration (ship alt) is defined by OPNAVINST 4700.7E as any change in the hull, machinery, equipment or fittings aboard a ship which involves a change in design, materials, number, location or relationship of the component parts of an assembly regardless of whether it is undertaken separately from incidental to, or in conjunction with repairs.

Based on the projected funds available to accomplish ship alts aboard a ship during its scheduled overhaul, the CNO establishes a cut-line on the Amalgamated MIP/TIP (AMT).[1] All ship alts above this cut become the Fleet Modernization Program (FMP).

The FMP is an integrated plan arrived at by combining the military alts from the MIP and the technical alts from the TIP for a ship. The FMP provides the summation or gathering together of all alts affecting Navy ships, originating from any one of a variety of activities or organizations so that the ship alts can be planned and funded on a ship-by-ship basis by a central activity.

The accomplishment of ship alts during an overhaul generally constitutes a sizable portion of the overhaul work package depending upon the class of ship and the number and type of alts authorized.

The ship alts are designated title D, F or K.[2] Those alts designated title D or F are authorized and funded by the Tycom, while those title K alts are authorized and funded by NAVSEASYSCOM.

Repairs, as defined by Article 2026 of Navy Regulations, are any work necessary to restore a ship or article to serviceable condition without change in design, materials, number, location or relationships of the component parts.

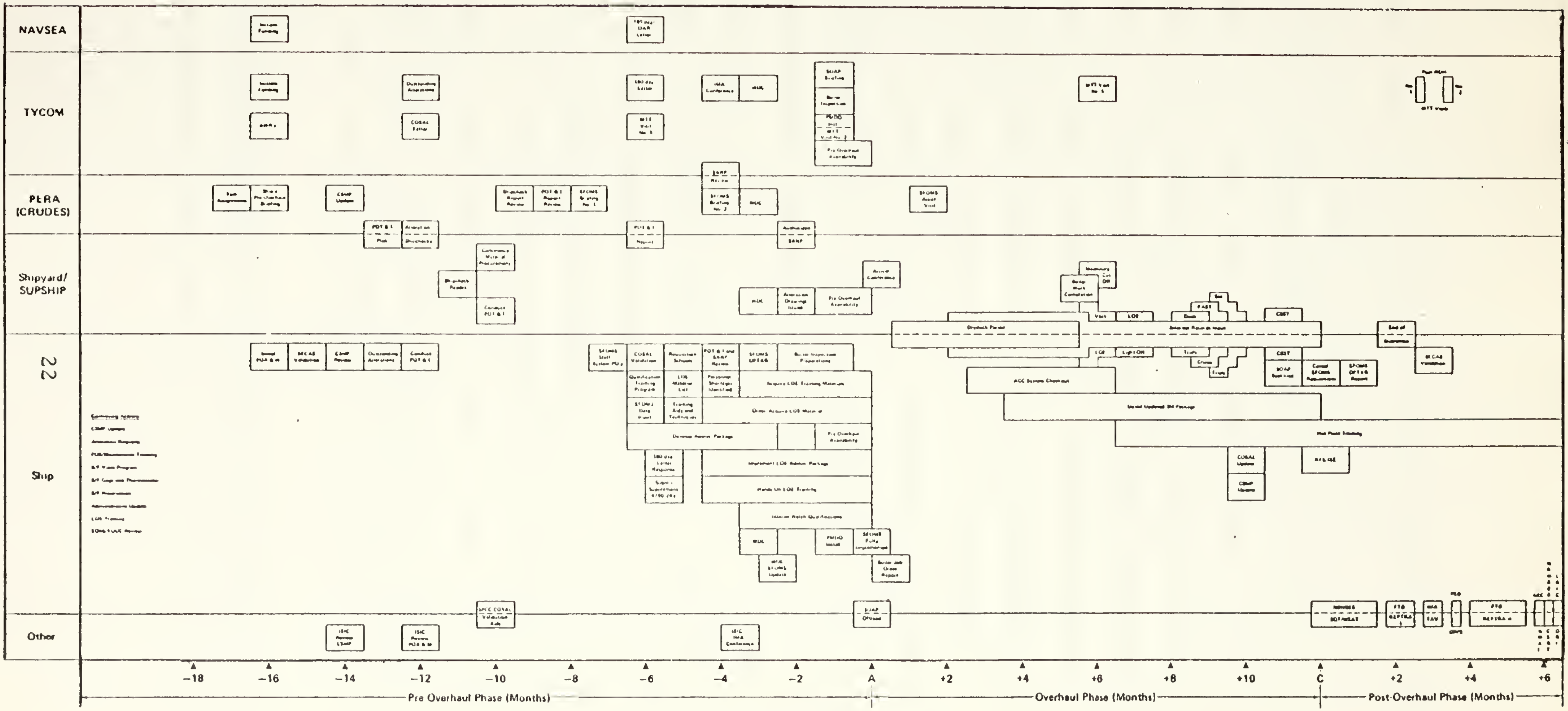
The repair work package consists of all identified repair work developed from Tycom recurring overhaul work items, the Pre-Overhaul Test and Inspection program and the Tycom authorized Title D and F alts.

D. DEFINING THE OVERHAUL REPAIR PACKAGE

This examination into the process of defining the overhaul repair work package will cover both the pre-overhaul managerial methodologies and the key participants in the Pre-Overhaul Process. Figure 2-1 is a block diagram that shows an idealized planning cycle and also serves as a summary of the organizational relationships and key milestones on the Pre-Overhaul Process.

The key participants in the Pre-Overhaul Planning Process are NAVSEASYSCOM, PERA (CRUDES), the Type Commander, the overhauling shipyard and the ships force. Additional and amplifying information may be found in Appendix B.

The Naval Sea Systems Command (NAVSEASYSCOM) is charged by the Chief of Naval Operations with the timely authorization and funding of ship alterations. The direct involvement of NAVSEASYSCOM in the Pre-Overhaul Process is initiated by the issuance of the so called NAVSEA 180-day letter. This document lists the Title K Ship Alts and ORDALTS which are authorized for accomplishment during the overhaul. NAVSEA has a vested interest in the overhaul, as a customer directly concerned with the accomplishment of the authorized Ship Alts and is indirectly concerned with the accomplishment of any repair work that must be concurrently authorized by the Type Commander to support the accomplishment of the NAVSEA Title K Ship Alts. This Ship Alt - repair package interface problem requires a meaningful working



IDEALIZED PLANNING FOR 12 MONTH OVERHAUL

FIGURE 2 - 1

relationship with the other customer, the Type Commander. Appendix B contains additional information concerning the functions of NAVSEA.

The Type Commander issues a Tycom 180-day letter for the accomplishment of Title D and F alts. This authorization is in addition to the approving, authorizing and funding the repair portion of the ship's overhaul package. The Tycom is the primary customer, with widespread involvement, ranging from tasking PERA (CRUDES) to prepare the Ship Alteration and Repair Package (to be discussed subsequently) to briefing the ship on the Supply Operations Assistance Program (SOAP).

PERA (CRUDES), the acronym for Planning and Engineering for Repairs and Alterations is a relatively new participant in the overhaul process having been conceived by Naval Ships Systems Command in 1966, as a plan of action to resolve the complex ship overhaul problem. PERA (CRUDES) is one of the Five PERA organizations.[3] The PERA organization is basically a centralized planning activity which augments the cognizant area of NAVSEA for the management control of the overhaul planning. It is charged with the responsibility for providing an integrated work package to the overhaul yards for each overhaul (for both regular and complex ROH's). This work package includes the technical, procedural, administrative and selected material requirements for that overhaul.

PERA (CRUDES) is tasked by NAVSEA and the Type Commander to perform a number of specific tasks that can be summarized into the

broad categories of integrating the planning for alteration, repair and overhaul of ships, and developing the programs in support thereof.

The Naval Shipyard is concerned with and is heavily involved in the pre-overhaul planning as the shipyard is the "primary consumer" of the results of the advance planning efforts. They have a strong and pragmatic interest, that ranges from the action required upon receipt of the 180-day letters, to the execution of the pre-overhaul tests and inspection, thru the completion of the industrial work authorized for shipyard accomplishment.

The managerial methodologies will be discussed sequentially, starting with the basic building block in the preparation of the repair portion of the overhaul work package, the Current Ships Maintenance Package (CSMP).

The CSMP is a product of the 3-M system. It is basically a compilation of all the ships deferred maintenance data forms (OPNAV Form 4790-2K, known as two-kilos, which are filled in by ships force). The CSMP provides the various ship maintenance managers with a consolidated listing of all the reported deferred corrective maintenance. The CSMP thus can provide the basic foundation for starting the preparation of the repair portion of the overhaul work package by the various participants.

The Tycom can utilize the CSMP to determine or approximate the actual material condition of the ship and to obtain an approximation of

the type and size of the repair work package, by individual onboard work centers. The information contained in the CSMP can also be used by the Intermediate Unit Commander to review and provide an input to the Tycom. This input can assume various forms, such as evaluating a ship's maintenance problems and making recommendations as to additional upkeep time, tender availabilities or additional money to the ship in the form of OPTAR[4] augmentations for an onboard self-help effort.

THE CSMP can provide PERA and the Shipyard preliminary information to utilize in planning for the repair action in support of that ship. Appendix C provides a detailed description of the CSMP.

The next and most critical to the accurate determination of the repair package is the Pre-Overhaul Test and Inspection (POT&I) Program. The POT&I was developed by PERA to provide documentation of the tests and inspections required to identify and formulate a comprehensive and thorough repair package and to document the justification for required repairs. PERA also coordinates the efforts of the inspecting activities including ships force, into a cohesive inspection and report program.

The objective of the POT&I program is to define a comprehensive and accurate picture of the ships repair work package, that will minimize overhaul work growth.

The POT&I program is divided into three phases; the POT&I plan, execution of the POT-I and the report of the results of the POT inspection.

POT-I plans are developed (by PERA or a shipyard) by ship class, based upon the first ship of that class to be overhauled using this program. The plan is updated and modified for each follow-on ship to be overhauled. The POT-I plans are interchangeable between shipyards with relatively "minor" modifications, generally necessitated by the differences existing among ships within a given class, and the differences in how shipyards conduct the Pre-Overhaul Planning Process.

The Index of the POT-I plan provides a detailed listing of the recommended systems and equipment that is to be inspected during the execution phase of the POT-I. Also contained in the Index, in addition to system, inspection and reference documentation, is the responsible activity for performing that particular test.

In an effort to hold down the cost of the POT-I, there are portions that are designated for ships force accomplishment. These selected portions of the POT-I are within ships force capability to accomplish. Additionally this involvement of ships force results in the tangible benefit of early ships force involvement in the overhaul process.[5]

The POT-I plan is composed of individual pages which contain the required information to conduct a specific test or inspection of a specific component of a system. This detailed breakdown allows for the systematic inspection of all designated shipboard systems and equipments in accordance with the Shipwork Breakdown Structure (SWBS). This SWBS system divides the ship into the following systems:

SWBS	CATEGORY
100 Series	Hull Structure
200 Series	Propulsion System
300 Series	Electrical System
400 Series	Command and Surveillance System
500 Series	Auxiliary Systems
600 Series	Outfitting and Furnishings
700 Series	Weapons

Two additional SWBS that show up later in the pre-overhaul process (specifically the Sarp, to be discussed next) are,

800 Series	Integration/Engineering[6]
900 Series	Ship Assembly[7]

Each of the SWBS is broken down into individual pages called Repair Inspection Record (RIR) pages for each entry in the Index. These RIR's in addition to assigning responsibility for performing a particular inspection or test also contain specific information as how to conduct that specific test and/or inspection and the space to record the results of the inspection/test. But most important, in terms of defining the repair package is the recommendations provided by the POT-I inspector as to the scope and magnitude of repairs[8] required to correct the identified deficiencies or discrepancies found for the particular item listed on the RIR. Additional information and amplifying examples may be found in Appendix D.

The Ships Force portion of the POT-I is conducted in advance of the shipyard's[9] portion of the POT-I to allow the shipyard to review and clarify any uncertainties, regarding any information on a particular RIR, that was inspected by ships force.

The execution of the POT-I inspection is conducted in two primary phases; at-sea and dockside. The underway POT-I requires approximately two days at sea. The dockside inport phase ideally requires about five to ten working days, depending upon the size of the ship, the number of shipyard inspectors, and the material condition of the ship.

Upon completion of the POT-I, a Post POT-I review or scoping conference may be held to ensure that the POT-I results are explicit and properly justified. Also the preliminary screening of the POT-I can identify preliminary repair assignments to the appropriate maintenance echelon.

After the POT-I the shipyard begins to integrate the ships force and shipyard POT-I results for each RIR, by ships system. Thus the overhaul work package is initially defined. The quality of this work package is a direct function of the professional quality of all the inspectors and of the diligence of the inspection effort. A properly defined work package is the result of a thorough and complete "team effort" by the ship's force, the overhauling shipyard, the Tycom and PERA.

All of the information from the CSMP and the POT-I is compiled into a single document, the Ship Alteration and Repair Package (SARP).

The SARP is the definitive document which specifies (1) all the repair work developed from the CSMP, the POT-I and includes mandatory Type Commander routines, the complete alteration work package consisting of NAVSEA authorized Ship Alts (TITLE K) ORDALTS and Type Commander authorized Title D and F Alts. Supplemental alteration work items or ships force work requests (via 4790-2K) will be integrated into the SARP after approval by the cognizant customer.

There are two versions of the SARP developed for each overhaul. The first version is the proposed SARP, which is the working document containing the recommended repair package. The proposed SARP contains the shipyard cost estimates (includes the required man-days and material costs) of accomplishing the overhaul work package. The work is identified on a ship system basis, and is broken down to the equipment or component level by a System Work List Item Number (SWLIN).[12] Appendix E contains the SWLIN structure breakdown. The proposed SARP is the document used at the Work Determination Conference (WDC).[13]

The Work Determination Conference[14] is a meeting of the Tycom, NAVSEA (for complex overhauls), PERA, the shipyard and ships force. The objective of the WDC is to authorize the overhaul work package from the information and cost data found in the proposed SARP. On the basis of the customer screening[15] by Tycom the proposed SARP is revised and reissued by the overhauling activity as the Authorized SARP.

The outcome of the WDC would produce a funding breakdown of the Tycom repair package by SWBS. For example for the USS KNOX FF-1052 overhaul in 1976:

Section	Amount in proposed SARP	Amount authorized at WDC
Hull Structure	$ 428,331	$ 242,403
Propulsion System	$3,391,550	$2,766,436
Electrical System	$ 420,550	$ 360,247
Command and Surveillance System	$1,484,833	$ 865,911
Auxiliary Systems	2,098,711	1,392,092
Outfitting and Furnishings	$1,377,187	$ 354,283
Weapons	$ 386,376	$ 135,028
Integration and Engineering	$ 93,346	$ 57,590
Ship Assembly	$ 622,455	$ 576,504
Total repairs and support	$10,300,121	$7,450,498

Note: Deferred work 28% of total work defined.

The purposes of the authorized SARP are [5]

1. Integrates related work requirements.

2. Resolves redundant and conflicting work requirements.

3. Identifies work on a Ship System basis.

4. Single source document of all customer-authorized work.

The Authorized SARP is then (1) a contractual agreement between the shipyard and the customer, that provides a written record of who does what and for how much, and (2) a historical document of some significance,as it is maintained current through the overhaul and is a useful device upon completion of the overhaul for (1) updating the ship's CSMP, (2) preparing the Shipyard Departure Report (providing useful information as to the actual man days and costs of the overhead as opposed to the APF) and (3) can be used for estimating future overhaul budgets.

The early definition of the overhaul work package at the WDC enables the shipyard to assess the effect of the ship's overhaul work package upon the shipyard's workload, begin the administrative preparation for the overhaul and begin procurement of long-lead-time material. Additionally early definition of the work package can enable the ship to start on its assigned portions of the repair work package, in advance of the overhaul start date.

However, the ship has, in addition to this assigned work, additional requirements during the pre-overhaul period such as:

<u>Training</u> - at any given time a number of ship's force may be off the ship at school.

<u>Military Duties</u> - the security and safety of the ship must be maintained requiring a number of ship's force for watch standing.

Operational maintenance requirements - due to the tempo of operations combined with the material condition of the ship, the ship's force effort may be exclusively directed at keeping the ship running. The magnitude of this effort may preclude ship's force from accomplishing any meaningful amount of this assigned work.

Morale - a realistic policy towards adequate leave and liberty MUST be maintained.

The managerial tool available to the ship's force to assist in scheduling, organizing and managing the ship's force work effort is the Ship's Force Overhaul Management System (SFOMS). Basically SFOMS is a computer-based Management Information System (MIS) that utilizes a computerized data base containing the ship's work load and manpower data. The ship provides the basic input data and receives back computer compiled reports that provide a "picture" of how its manpower resources are being utilized. SFOMS is only a managerial innovation or tool for use in planning and managing the ship's force portion of the overhaul work package. SFOMS itself will not solve any of the problems that may arise during the overhaul concerning allocation of ship's force resources, but does provide identification of problem areas, and supporting data that may aid in solving the problem. Appendix F contains additional information on SFOMS.

E. PROPULSION EXAMINATION BOARD/LIGHT-OFF EXAMINATION (PEB/LOE)

The PEB/LOE concept was created by OPNAVINST 3540.4 of 19 Nov 1972. This instruction was the charter document which directed the establishment of 1200 psi Propulsion Examining Boards, described their authority, responsibility and designated membership and prescribed administrative procedures. The PEB/LOE concept was directly conceived in response to the deteriorating material condition of the 1200 psi steam propulsion plants. The 1200-pounders have been giving the Navy headaches for some time. Boiler explosions in the USS DEWEY (DLG-14) and USS GOLDSBOROUGH (DDG-20) caused deaths on both ships.

Of the numerous contributing factors, personnel error, attributable to insufficient training in plant operation and maintenance, and a lack of properly trained and qualified personnel have been identified as major causes of 1200 psi propulation plant personnel and material casualties. Recent Fleet INSURV and Navy Safety Center inspections have revealed improper engineering practices and unsatisfactory material conditions existing in many 1200 psi ships. Early in 1974 CINCLANTFLT PEB found 21 of 25 ships inspected were unsatisfactory.

The method which PEB uses to ensure the ship's 1200-psi engineering plant is safe and efficient is by conducting two types of periodic examinations. One examination is the Operating Propulsion Plant Examination (OPPE), the other is a Light-off Examination (LOE).

The initial Light-off Examination is conducted prior to lighting the first fire in any boiler during a regular overhaul or major conversion. The PEB will ascertain the state of training of propulsion plant operating personnel, the adequacy of administrative procedures and the material readiness of the engineering plant and machinery spaces [6]. A list of recurring PEB discrepancies may be found in Appendix G.

The Operational Propulsion Plant Examinations are to be conducted within six months of the last initial LOE and approximately every 18 months thereafter.

The PEB/LOE represent two areas of major concern to the Pre-Overhaul Planning Process. The first area is scheduling the ship's manpower utilization effectively throughout the overhaul to meet the requirements of PEB/LOE. The second area is the requirement of sufficiently improving the engineering plant and machinery spaces to meet PEB standards. This work required for the achievement of PEB standards must be recognized and identified during the Pre-Overhaul Planning Process for inclusion into the overhaul repair package for shipyard or ship's force accomplishment.

This chapter has presented an overview of the development of an overhaul repair package considering: (1) the Navy maintenance strategy, (2) the categories of maintenance periods, (3) the contents of the overhaul work package and (4) the process of defining the overhaul repair work package. The pre-overhaul managerial methodologies and the

key participants are presented as to impart to the reader an appreciation of the magnitude of effort that must go into the development of an overhaul repair package.

CHAPTER II

FOOTNOTES

[1]The MIP or Military Improvement Program, identifies incompleted projects and new improvement items affecting the military characteristics of a ship class. The TIP or Technical Improvement Program is a summary of incompleted projects and improvement items affecting material, performance, reliability or safety of a ship class. Representatives of CNO, NAVSEASYSCOM, Tycom and PERA (CRUDES) meet to assign priorities or alterations in the MIP and TIP. When agreement is reached on the assigned priorities the result of this conference is the AMT.

[2]Ship Alts for ships in commission are designated as follows; Title F is assigned to alterations that are capable accomplished by forces afloat and do not require a special program material, no industrial outside assistance is required. Title F alterations are authorized by the Type Commander for forces afloat accomplishment. Title D is assigned to alterations which are equivalent to repair (AER). Title D ships are authorized by the Type Commander and funded under OM&N funds. Title K is assigned to all other type ship alterations authorized by NAVSEASYSCOM as specified within the FMP.

[3]The five PERA organizations are:

a. PERA (SS) Submarines located at Portsmouth NSYD.

b. PERA (CV) carriers located at Puget Sound NSYD.

c. PERA (CRUDES) Cruiser/Destroyers Philadelphia NSYD.

d. PERA (CSS) Combat Support Ship NISO San Francisco

e. PERA (ASC) Amphibious Ships and Craft Norfolk NSYD.

[4]OPTAR- A Type Commander assigned quarterly operating target (OPTAR) for designated expenses, e.g., equipage, consumable material and repair parts.

[5]Ships force involvement is also in the form of breaking out and supplying the results of inspections by outside activities such as INSURV, NOSSO, PEB, MOTU, IUC BAT, etc. These reports of inspection should be submitted as supplemental to the inspection requirements of the POT-I RIRS.

[6]Includes items as ship's force overhaul management system, design support, antenna photographs, weapons system alignment, selected record drawings and technical documents.

[7]Includes trials fire protection, tests and inspections, contractor support staging, drydocking, temporary services, material handling cleaning.

[8]The recommendations are in the form of specific minor repairs, Class C repairs or for Class B overhaul with supporting justifications.

[9]Though normally the overhauling shipyard conducts the POT-I, other repair activities can be used or a private contractor can be employed. During 1975 approximately 8 POT-I's were accomplished by a civilian contractor.

[10]The POT I review is currently being conducted by PERA (CRU-DES) for the Tycom.

[11]Tycom routines are standard items of work requested if needed during each overhaul, regardless of ship type. Typical routine items include Hull Access, Defueling the Ship, Minor Assist Work, Assist Ships Force (ASF), Temporary Services and Utilities, Crane and Rigging services, Staging and Routine dry dock work.

[12]The SWLIN is a seven digit alphanumeric code that is used to identify overhauling work and to refer to the contents of the pages of a given system (SWBS) in the SARP.

[13]The Work Determination Conference was formerly called the Pre-Arrival Conference.

[14]The Work Determination Conference is held at 160-145 days before the Overhaul Start Date.

[15]The screening of work is to the Shipyard Ship Force or to the IMA for accomplishment. The work not authorized is deferred.

III. THE PRE-OVERHAUL PLANNING PROCESS - A NORMATIVE VIEW

A. PURPOSE

With the basic knowledge of the Pre-Overhaul System as described in Chapter II, we are ready to examine the Pre-Overhaul Planning Process. The purpose of this chapter is to present a normative examination of the Pre-Overhaul Planning Process as opposed to attempting to identify all the deficiencies and problem areas that may arise during the pre-overhaul period. The author believes it is more meaningful and constructive to present how the Pre-Overhaul Planning Process should work, rather than how it does not work. Presenting how the process should work will also make this examination more applicable to a wider range of application in the Pre-Overhaul Planning Process for future overhaul.

This normative examination will be presented from the perspective of the Type Commander Representative conducting the Work Determination Conference approximately 5 months prior to the overhaul start date.

B. THE FRAMEWORK OF THE PRE-OVERHAUL PLANNING PROCESS

Within the analytical framework of the Pre-Overhaul Process as represented by Figure 3-1 the Tycom-Rep is preparing to conduct the WDC, utilizing the information collected previously during his earlier ship checks.

The Analytical Framework of the Pre-Overhaul Process

Initial Knowledge of Ship's Material Condition	Actual Material Condition	Work Selection Decision Process	
POT-I Plan	Proposed SARP	Auth SARP	
CSMP VALIDATION CONFERENCE	POT-I SCREENING CONFERENCE	WORK DETERMINATION CONFERENCE (A-Time)	ROH
A-14 months	(A-9 months)	A-5 months A-0	

Figure 3-1

The first normative milestone event (at A-14 months) commenced when the Tycom-Rep boarded the ship to conduct the CSMP validation conference. The primary objective of this validation conference was to ensure that the ship's actual material condition was accurately reflected by the CSMP. After the validation conference the CSMP was able to provide a complete, accurate and comprehensive description of all outstanding, corrective maintenance actions that have been documented or reported by ship's force. The information in the validated CSMP was then utilized as the cornerstone in the pre-overhaul planning effort for repair action in support of the overhaul.

The next milestone in the Pre-Overhaul Planning Process was the POT-I, conducted at the A-9 month point. The Tycom had scheduled the ship for 10 days in port and 2 days underway for the POT-I. The initial input into the POT-I program was the information provided

the CSMP validation conference. This initial information provided the shipyard a valuable and advance insight into the actual material condition of the ship and a starting point from which to accurately begin the POT-I. The ship's force played a critical role during the execution phase of the POT-I by providing assistance to the shipyard POT-I team. This assistance was in the form of supplying amplifying information on specific component, equipment or system operations maintenance history, operating characteristics, or other similar type information that is not required to be documented in the 3-M System. Additionally ship's force was able to provide technical manuals and equipment documentation that was of valuable assistance to the Shipyard POT-I team in executing the POT-I Plan. Assistance also was rendered by ship's force during the POT-I by demonstrating equipment operation, opening manholes, aiding in equipment identification and location, etc.

The POT-I team that executed the POT-I plan used inspection criteria that utilized existing test and inspection procedures to the maximum practical extent. The sources of standard procedures were found in:

1) System Level Planned Maintenance System (SL/PMS) Procedures.

2) Planned Maintenance System Equipment Maintenance Requirement Cards (PMS/MRC).

3) Shipyard Test Memoranda.

4) Technical Specifications for Equipment Subsystem and System (Tech Specs).

5) System-Equipment Documents from the Applicable System Commands.

6) Process Instructions.

All recommendations for repair or overhaul were made from supporting data, based upon the actual material conditions which was recorded in the POT-I results. Additionally any unusual circumstances that contributed to the material condition deficiencies, along with interferences were accurately reported.

In the inspection of components/equipment, measured tolerances vs. standard allowable tolerances were listed as illustrated in Appendix D. Where applicable, Machinery Condition Analysis (MCA, vibrational analysis) was included along with acceptable standards for comparison.

The results of the POT-I were based upon the objective measurement of equipment performance and operation, as opposed to the subjective evaluation of recommendation for repair or overhaul without supporting data from the actual material condition and test results. For example, if no work was indicated as a result of the POT-I test, the recommendation did not call for a Class B overhaul.

The Tycom-Rep returned to the ship for a second conference 2 days prior to the completion of the POT-I to conduct a POT-I screening conference. The Tycom-Rep, prior to screening the POT-I, has

defined the overhaul objective to be:

> "to improve the ship's material condition to a level necessary to ensure the safe and reliable operation and performance of all assigned missions during the post-overhaul operating cycle."

In defining this objective the Tycom-Rep was able to strike a "compromise agreement" between the "operation-types" and the "maintenance types." This compromise was required as the "operators" expect ships to be capable of continuous and trouble-free operation in executing all assigned operational commitments in the Post-Overhaul Operating cycle. The operators have a valid point in that the number of operational commitments have increased while the total number of ships has decreased. The "maintenance-types" also have a valid point in that ships cannot give the expected level of continuous and trouble free operation without a sufficient amount of maintenance, repair and upkeep time, which may interfere or disrupt the scheduled operational commitments.

The degree of achieving this objective will be measured by a comprehensive Overhaul Test Program (OTP). This testing will be conducted throughout the overhaul and will extend some six months into the post-overhaul period, even though by NAVSHIPS Instruction 7600.35A of 10 Feb 1971, the warranty period on shipyard work is limited to 60 days after the overhaul completion date. Prior to the end of the warranty period the ship and all its associated systems will have been "checked out" by completion of;

(1) Individual Job Testing procedures to verify the quality of shipyard work before the job can be signed off as completed, while the ship is still in overhaul.

(2) PEB/LOE which will determine the adequacy of repairs to the main propulsion and associated auxiliary equipment to meet PEB standards, also conducted while the ship is still in overhaul.

(3) Dock Trials which will conduct preliminary operational tests on main propulsion, auxiliary electrical and internal communication systems while the ship is dockside in the shipyard.

(4) Fast Cruise, an underway simulation, that will take place after Dock Trials. During the Fast Cruise all equipment and systems will be integrated and tested, while alongside the dock, in a simulated at-sea environment. All equipment and systems required for use at sea will be thoroughly tested.

(5) Sea Trials occur after all productive work has been satisfactorily completed and the discrepancies corrected that developed during the Dock Trials and Fast Cruise to the satisfaction of the ship's Commanding Officer and the shipyard ship's superintendent. Sea trials represent the final step in proving the success of the overhaul by testing the ship under actual at-sea conditions.

The machinery sea trial tests the ship's propulsion plant and auxiliary equipment by a four-hour full-power run. During the combat system portion of sea trials all ordnance and ordnance handling equipment,

fire control radar and gunfire directors, sonar, air and surface search radars ECM suite, navigation and navigational aids, and communications equipment will be thoroughly and comprehensively checked out and tested.

In the six months after the completion of the overhaul a number of inspections and training evolutions are scheduled to evaluate the effectiveness of the overhaul and the readiness of the crew to support the operational capability of the ship. Among these evolutions are; (1) Ship Qualification Trials (SQT) to test the overhaul weapon system capability and conduct operational training of the ship's combat system operators.

(2) Weapon System Accuracy Trials (WSAT) to verify the operability and accuracy of ASW systems.

(3) Operational Propulsion Plant Examination (OPPE) which is PEB's certification of the ship to safely steam the propulsion plant.

(4) Nuclear Weapons Acceptance Inspection (NWAI) examines the ship's force ability to safely handle nuclear weapons.

(5) Combat Systems Readiness Test (CSRT) evaluates the combat system's material and personnel readiness prior to deployment.

(6) Operational Readiness Inspections (ORI) evaluates the ship's readiness to fulfill its required operational capabilities.

In reality, there is a definite and pronounced tendency for these tests to replace the overhaul objective. It must be clarified that these tests are only a means of measuring the success of achieving the objective.

In addition to the overhaul objective the Tycom-Rep must be fully and completely aware of the "real-world" overhaul constraints, that exist throughout the Pre-Overhaul Planning Process for any overhaul.

These overhaul constraints when viewed from the Tycom-Rep's perspective seem to make the accomplishment of the Overhaul Objective nearly impossible to achieve. The first and most restrictive, is the limited amount of overhaul funding available to accomplish all identified repair work. As there are no dollar estimates in the POT-I report, this constraint is not clearly defined during the POT-I Screening Conference. At best the experienced Tycom-Rep will have only an intuitive feel for the estimated dollar value of the repair package, based upon his past overhaul experiences. By the WDC, this constraint will have become very clearly defined, when the total identified work has been assigned a dollar value, and exceeds available funding by several million dollars.

Concomitantly, the effect of the scheduled shipyard work loading can also be a limiting factor on the size of the overhaul repair package. This is caused by the finite amount of shipyard repair man-days available to accomplish the authorized work on all the ships concurrently scheduled for overhaul, SRA's or RAV's.

Several time constraints must also be recognized. The availability and the location of the ship for the CSMP Validation Conference, the POT-I and the WDC may be very difficult to finalize as to exact dates or location. For example, (1) A ship may not have operating days available for the underway portion of the POT-I. (2) The ship may be

deployed causing the POT-I Execution and WDC to be accomplished under less than ideal conditions. (3) Unscheduled operations may require the ship to be underway unexpectedly, therefore requiring reformulation of dates and location. (4) The ship may have been scheduled for other types of operational inspections, such as an PEB/OPPE, Nuclear Weapon Acceptance Inspection, a Tender availability arrival conference or any other event that diverts ship's force attention from the "scheduled" Pre-Overhaul planning event.

The second time constraint is the length of the overhaul period. This is another constraint that must be recognized early in the pre-overhaul period, but will not become fully apparent until after the overhaul has started. This constraint will only become evident if major work, not identified during the Pre-Overhaul Planning Process emerges as new work or growth on existing work during the overhaul necessitating an overhaul extension. If an extension to the CNO-scheduled availability dates is required, the significance of this constraint is reflected by; (1) the impact on the ship's post-overhaul operating schedule, (2) the impact on the other ships concurrently in overhaul, caused by the reallocation of shipyard resources to complete the delayed ship in the minimum possible time, (3) downstream slippage on other scheduled overhaul start dates.

The ship's force is faced with numerous constraints from Pre-Overhaul Planning period through the completion of the overhaul. These

constraints must be realistically recognized by the Tycom-Rep. These constraints form an upper limit on the amount and type of work ship's force can realistically be expected to accomplish, before and during the overhaul period.

These basic constraints include;

(1) Time: The Ship's Force Personnel during the overhaul are continually faced with time constraints. All ship's force work must successfully interface with the scheduled shipyard work. The ship's force also has numerous military duties to perform, concurrent with the assigned overhaul work that consumes valuable manpower resources.

(2) Manpower: The ship is normally not manned to the specified manning levels. Additionally during the ROH, is the time that many of the ship's force personnel are sent off to attend various service schools. The remaining manpower must accomplish all military duties, housekeeping and provide numerous personnel for shipyard related duties, such as providing fire watches. After all these requirements have been met, the ship's force must accomplish that work assigned for ship's force accomplishment.

(3) Onboard Repair Capability: That portion of work assigned to ship's force should be within the on-board repair capability. Work beyond ship's force capability should be a ship-to-shop nature, that is, equipment/components

that ship's force can remove and deliver to the assigned IMA for repair. Additionally, work may be within ship's force repair capability, but lack the qualified repair personnel, or else too much work is assigned to that repair work center to realistically accomplish.

(4) Money: Any large amount of ship's force repair effort may require an OPTAR augmentation to allow the purchase of the required repair parts/materials.

(5) Material Availability: From the time the ship's force portion of the overhaul work package has been identified and the OPTAR augmentation approved, material lead time becomes a constraint. Many of the required repair parts/materials are long-lead-time items. The time delay from ordering to receipt of parts may preclude accomplishment without impacting other scheduled jobs, given the manpower and time constraints at that time.

(6) IMA Limitations: The amount of repair work assigned to ship's force for IMA accomplishment is limited by the following: (1) the amount of repair man hours available from the IMA, (2) the limited nature of repair due to the ship-to-shop criteria of a concurrent IMA availability, (3) low priority assigned ships in concurrent availability by the tender, (4) the often poor quality of IMA repairs,

(5) material/repair part availability, (6) tender repair funds (ROV) required to support the concurrent overhaul repairs may not be sufficient.

Having reviewed the Overhaul Objective and constraints the Tycom-Rep began the POT-I Screening Conference. The conference consisted of the Tycom-Rep reviewing and screening each individual Repair Inspection Record (RIR) with the Shipyard POT-I team, the Shipyard Type Desk Officer, PERA (CRUDES), Ship's Force and IMA-rep present. The objective of that conference was 1) to ensure the POT-I results (RIR's) accurately and sufficiently described the material condition to minimize the uncertainty of the actual material condition of the ship, (2) identify the Tentative Shipyard Overhaul repair package, and the ship's force and IMA work packages, (3) identify the long-lead-time materials so as to begin advance material procurement utilizing available advance overhaul funding.

The next and final milestone within the analytical framework of the Pre-Overhaul Planning Process is the Work Determination Conference, held approximately five months prior to the CNO-assigned overhaul start date. The objective of the WDC is to formally authorize the overhaul work package.

C. THE SELECTION-DECISION PROCESS

The actual process of authorizing the work package is one of selection and decision as how to best achieve the objective given the

constraints. Essentially this selection-decision process is a multi-level hierarchy composed of five basic decision categories;

(1) Is Repair/Replacement required?

(2) What maintenance echelon is required to accomplish category 1 repair or replacement?

(3) What scope of repair is required?

(4) When is the best time to accomplish these repairs?

(5) Who is assigned the repair of the component?

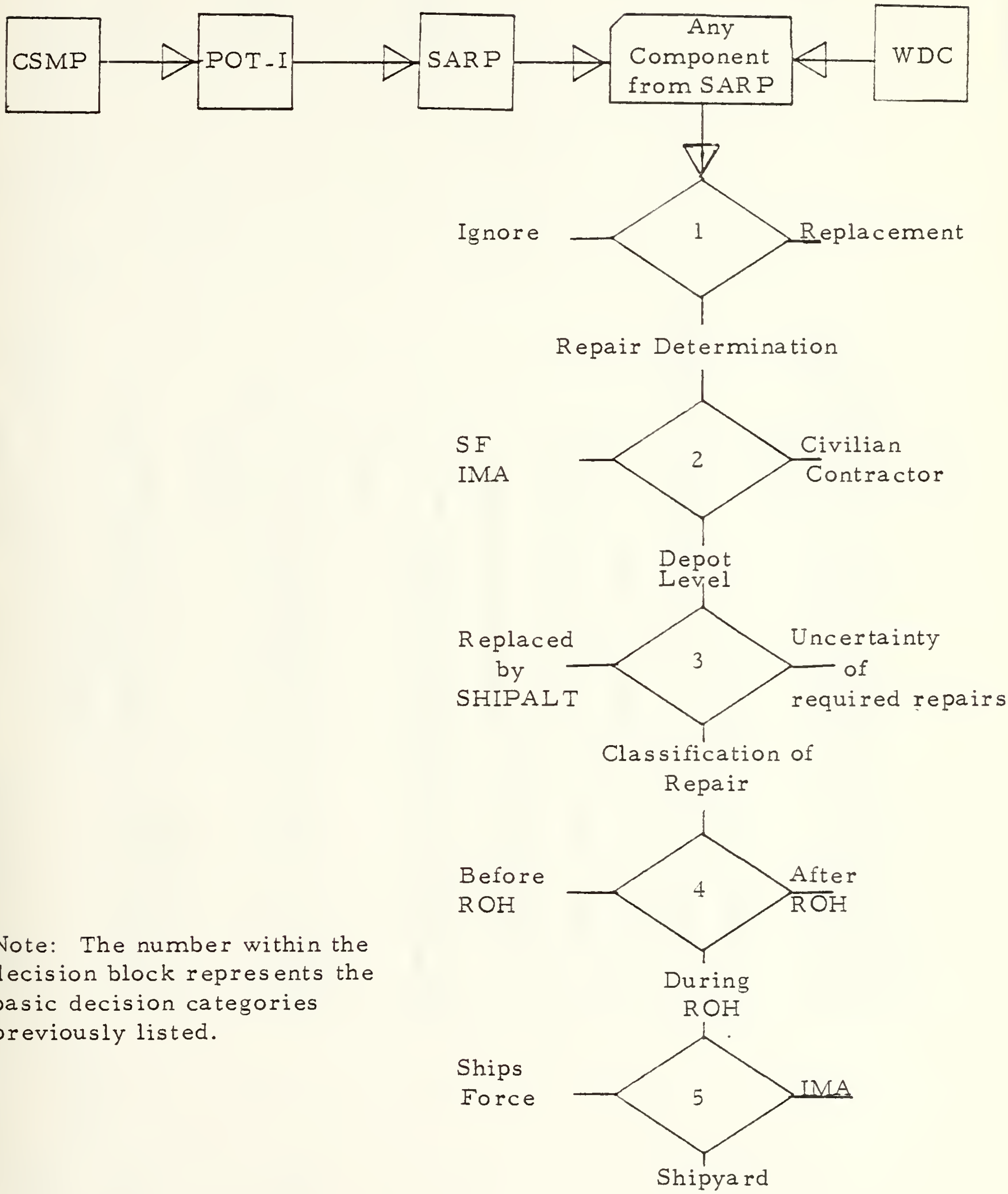
These decision categories of the Selection Decision Process may be visualized hierarchically by a simple pictorial representation or flow chart as illustrated by figure 3-2.

The procedure the Tycom-Rep will use at the WDC is to take a component and run it through the five decision categories of the Selection Decision Process. The objective of this process is to formally define the overhaul repair package and achieve the greatest amount of repairs possible, given the level of funding available. Figure 3-3 summarizes the information that is derived from the Selection-Decision Process, and is recorded in the authorized SARP.

For example, the first decision category will determine if repair is actually required. Within this first category the decision outcome may be (1) no work is required, (2) replacement the component as opposed to repairing it, (3) component repair is required, (4) defer repair to the component to a later time. Next on the second decision level, the

Figure 3.2

The Hierarchical Representation of the Five Decision Categories



Note: The number within the decision block represents the basic decision categories previously listed.

SHIP SYSTEM WORK DESCRIPTION

HULL NUMBER	SYSTEM	JCN AS INDICATED BELOW	TITLE
DD-822	FUEL OIL SERVICE		MAINTENANCE AND REPAIR
SWLIN: 261A01A	TOTAL SHIPYARD COST:	EIC GROUP: F501	

JCN	ITEM NO.	DESCRIPTION	M/D	MATL $	COST $	ASSGMT	PRI
(EB01-A486)	1.	Accomplish Class "B" overhaul on the No. 2 Main Fuel Oil Service Pump including replacement of mechanical seal. (261-02)			4,300	SY	2
(EB01-A571) (EB01-A572)	2.	Chemically clean and accomplish hydrostatic test of No. 1 & 2 Fuel Oil Service Pump, Lube Oil Coolers. (261-02)			1,410	SY	2
	3.	Accomplish the following items on No. 1, 3 & 4 Fuel Oil Service Pumps (TD), turbine end: a. Accomplish PMS requirements E6/117-53, items C1 thru C3. b. Remove, test and reinstall relief valves. c. Inspect carbon packing for wear. d. Clean and inspect exterior of casings, represerve. e. Repack pump - liquid end. (261-02)			3,730	SY	3
	4.	Provide and install steam strainers and drain piping with associated valves/fitting for No. 3 & 4 Fuel Oil Service Pumps. (Piping, valves & fittings are 4" IPS). (261-02)			1,500	FA	4

FIGURE 3-3

decision of what maintenance echelon, based on its repair capabilities, can best accomplish the repairs will be made. The repair of the component may be assigned (1) to ship's force, (2) IMA activity, (3) to a civilian contractor, (4) to the naval shipyard. The third decision level will investigate and evaluate the scope of repairs required considering (1) the possibility that an authorized Shipalt may replace the component and thus not require repair, (2) the magnitude and scope of repair may be uncertain or unclear requiring additional investigation of the component, (3) the classification of repair or overhaul will be made between Class B or Class C repairs.[1] The fourth decision level will determine the optimal time to accomplish the repair. The decision from this level will be to repair the component (1) before the overhaul, (2) during the overhaul and (3) after the overhaul. The fifth decision level will determine who will be assigned the repair of the component, based upon the results from the first four decision categories.

The Selection-Decision Process begins with the first SWLIN in the Hull Structure group (SWBS 100) and ends with the last SWLIN in the Ship Assembly group (SWBS 900). Figure 3-4 provides partial breakdown of the major SWBS groups. The proposed SARP containing all of these SWLIN's is of considerable length, having upwards of 300 pages for the "average overhaul," and may vary considerably from ship to ship. Each page of the SARP may contain from 1 item or component to upwards of 50-75 components that must be processed individually.[2] The Tycom-

Figure 3-4
Partial Breakdown of SWBS Groups

SWBS Group - 100

Hull Structure

110 - Shell and Supporting Structure
120 - Hull, Structural bulkheads
130-Hull, Decks
140-Hull, Platforms and Flats
150-Deck-House Structure
160-Special Structures
170- Masts, King Posts
180-Foundations
190-Special Purpose Systems (tanks and voids)

SWBS Group - 200
Propulsion Plant

220-Energy Generating System
230-Propulsion Units
240-Transmission and Propulsor Sys.
250-Propulsion Support Systems (Except Fuel and Lube oil)
260-Propulsion Support Systems (Fuel and Lube Oil)

SWBS Group - 300
Electric Plant

310-Electric Power Generation
320-Power Distribution Systems
330-Lighting System
340-Power Generator Support Sys.
390-Special Purpose Systems (calibration of electrical test equipment)

SWBS Group-400
Command and Surveillance

410-Command and Control Systems
420-Navigation Systems
430-Interior Communications
440-Exterior Communications
450-Surveillance Systems (Surface)
460-Surveillance Systems (underwater)
470-Countermeasures
480-Fire Control Systems
490-Special Purpose Systems (calibration of electronic test equipment)

Figure 3-4
(continued)

SWBS Group - 500
Auxiliary Systems

510-Climate Control
520-Sea Water Systems
530-Fresh Water Systems
540-Fuel and Lubricants Handling and Storage
550-Air, Gas, Misc Fluid Systems
560-Ship Control Systems
570-Underway Replenishment Systems
580-Mechnical Handling Systems

SWBS Group - 600
Outfit and Furnishings

610-Ship Fittings
620-Hull Compartmentation
630-Preservatives and Coverings
640-Living Spaces
650-Service Spaces
660-Working Spaces
670-Stowage Spaces

SWBS Group-700
Armament

710-Guns and Ammunition
720-Missiles and Rockets
750-Torpedoes
760-Small Arms and Pyrotechnics

SWBS Group-800
Integration/Engineering

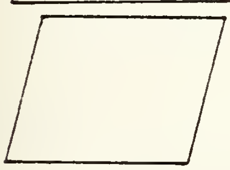
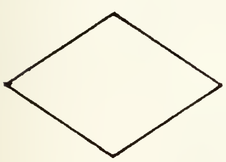
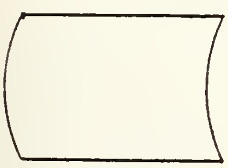
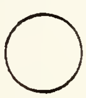
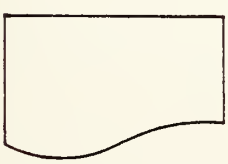
810-Production Engineering
830-Design Support
840-Quality Assurance
850-Integrated Logistic Support

SWBS Group-900
Ship Assembly

982-Dock and Sea Trials
985-Fire Protection
986-Tests and Inspections
988-Contractor Support
991-Staging
992-Temporary Services
993-Material Handling
994-Cleaning
997-Drydocking

Rep expects to spend at least 2 days screening all of the SWLIN's in the proposed SARP.

In the screening of each individual SWLIN with the Selection-Decision Process, the Tycom-Rep will have to consider many diverse peripheral factors that will be encountered on each level of the five decision categories. These peripheral factors will be presented subsequently as each decision category is discussed in detail and graphically represented. The following symbols will be utilized for the pictorial representation of the Selection-Decision Process.

Symbol	Explanations
	The individual component/equipment listed on the SWLIN.
	Selection-Decision Result
	Selection-Decision Point that determines which path will be followed.
	Peripheral factor consideration
	Connector; Exit to or entry from another part of the chart.
	Authorized Repair Item for inclusion in the authorized overhaul repair package.

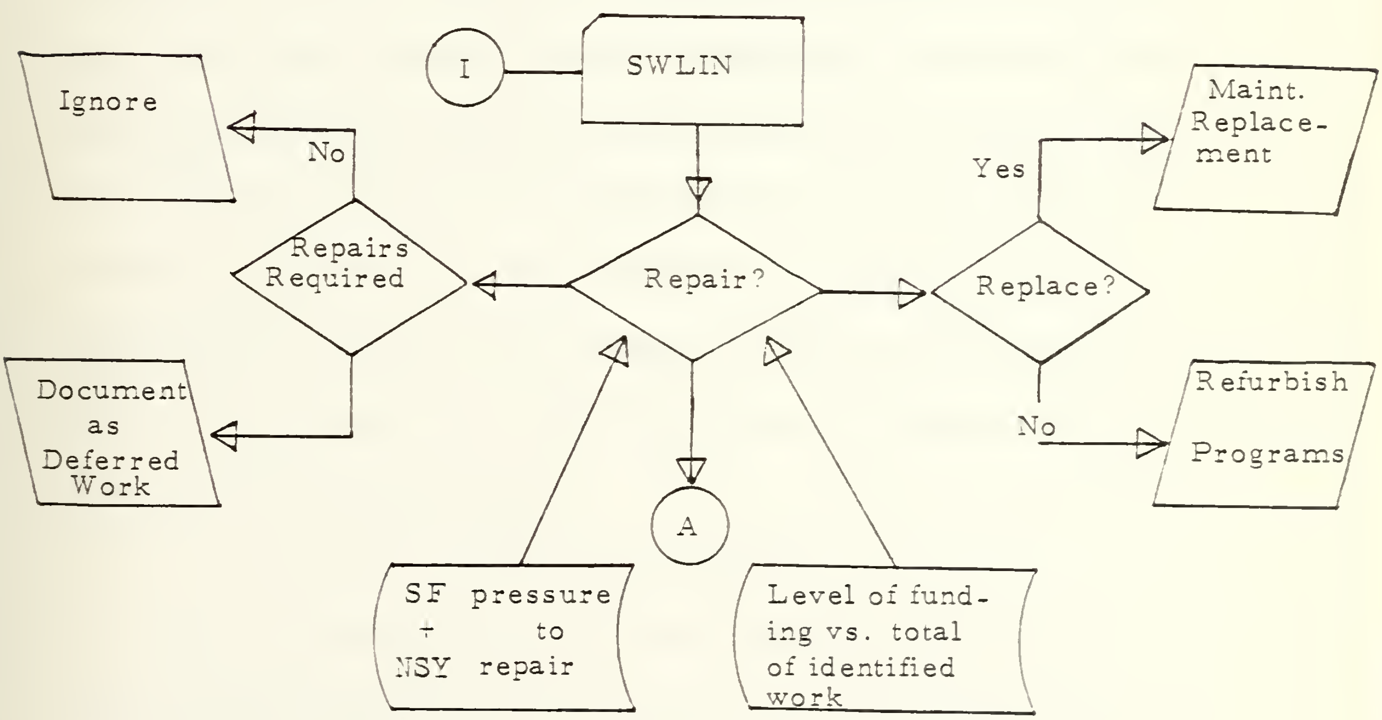
In the detailed examination of the Selection-Decision Process the basic framework illustrated in Figure 3-2 will be expanded upon in greater detail. This will be accomplished by the use of selective components to illustrate or amplify the particular decision category under consideration.

These selective components will be chosen from the Proposed SARP used at the WDC by the Tycom-Rep.

The detailed framework for the first Decision Category is shown by Figure 3-5.

Figure 3-5

Detailed Framework for the First Decision-Category



The component selected to run through to demonstrate the first Decision Category of the normative Selection-Decision Process will be the NR 1 Fire and Flushing Pump. As a result of a vibration survey and the observed performance characteristics recorded during the POT-I, the shipyard recommendation in the Proposed SARP is to Class B overhaul both the pump and the motor. Having determined that the pump does indeed need repair based upon the shipyard repair recommendation, the Tycom-Rep has two options available;

(1) accomplish Class B repairs to both the pump and the 100 HP electric motor.

(2) Replace the bronze alloy pump casing with an alloy 20 stainless steel maintenance replacement pump casing and separately overhaul the motor. This option is dependent upon the availability of replacement pump casings from the supply system. The Tycom-Rep had investigated the availability before the WDC, and found that none were available, so this is not a viable option to consider.[3] Another alternative that exists is for the Tycom-Rep to utilize the various refurbishment programs. For example, the ship's 5'54 MK42 Mod 7 gun mount was found by the POT-I to be in need of extensive repairs. Again two options are available;

(1) Class B overhaul the gun mount.

(2) Remove the gun mount and ship to the refurb activity, Naval Ordnance Station Louisville, Kentucky. The gun mount would be

entered into the gun mount refurb program and would be returned to a ship ready for reinstallation, with all the upgrading modifications and improvements installed.

More will be said of these two examples, (the fire and flushing pump and the gun mount) as we proceed through the remaining decision categories.

There are three other possible decision outcomes from the first decision category. First, if any item does not require any work, the process is complete and we cycle to the next component. Second, the item may require modification, as recommended by the shipyard or requested by ship's force, but would require a ship-alt to be accomplished, that had either not been authorized or developed. Therefore no further processing is required. Again we cycle to the next component. The third item is more difficult for the Tycom-Rep to deal with. In this area is found the components that must be deferred. The primary reason for the deferment of this work is usually caused by the most restrictive constraints; the finite amount of available overhaul funding. In fact this constraint is omnipresent throughout the entire Selection-Decision Process, and must be constantly considered by a rational decision maker. The Tycom-Rep, by a combination of having reviewed the SARP prior to the WDC, drawing upon his experiences in other overhauls and constantly reviewing the overhaul objective has an intuitive feel for what is minimally required for a basic overhaul repair package. This basic

overhaul repair package must be sufficient to ensure the overhaul objective can be achieved. Considering a ship as a complex collection of groups or systems as depicted by figure 3-4, there exist many components, some of which are more vital than others to the total ship system. In screening the collection of total ship components (SWLIN 110A01A thru 997A01A), the vital components must be considered in priority before the non-essential components. An obvious example would be the Tycom-Rep authorizing the repair of a 1200 psi main-steam stop valve before considering the repair or replacement of a 1-inch stop valve from the ship auxiliary steam system . Many components are not as obvious as to importance when considering the total ship system. The Tycom-Rep for example must be able to assess the relative importance of repairing one of three AN/URC-32A radio transceivers requiring minor Class C repairs as opposed to Class B repairing the AN/UPN-12B Loran receiving set. The essential point to be drawn from these examples is that the Tycom-Rep must be total ship system orientated in arriving at a decision from the first decision category.

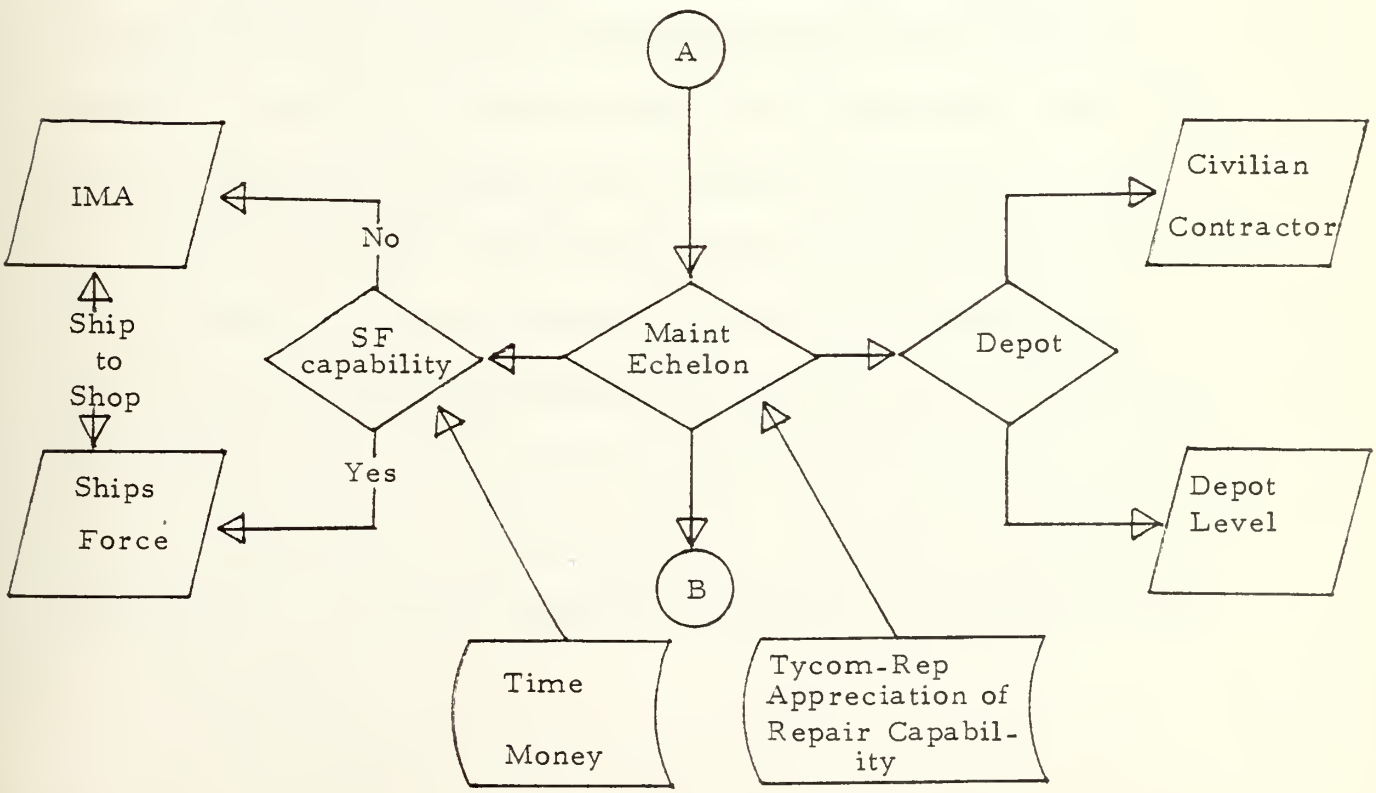
Additionally, the Tycom-Rep will be subjected to pressure from the ship's force and shipyard personnel to accomplish some of the repairs the Tycom-Rep is considering to defer. The ship would like to have as much work as possible done by the shipyard in order to restore the ship to a "like new" condition, a posture supported in theory by Navy Directives but at odds with the fiscal reality of insufficient

overhaul funding with which to accomplish all identified work. The shipyard believes it should repair systems as opposed to components to facilitate the accomplishment of the various comprehensive system-oriented overhaul tests. The shipyard inevitably seeks a "tight," well-defined work package with minimum overlap of responsibility between ship's force and the shipyard to preclude "finger pointing" late in the overhaul if the component or system fails testing. The Tycom-Rep seeks to achieve maximum effectiveness per repair dollar spent, in order to get the greatest amount of repairs possible.

Moving next to the second Decision-Category as illustrated in Figure 3-6, the Tycom-Rep determines which maintenance echelon can best accomplish the repair.

Figure 3-6

The Framework of the Second Decision-Category



Considering again NR 1 Fire and Flushing Pump the options available are; (1) Screen for shipyard accomplishment, (2) Screen to SF/IMA, (3) Screen to a private commercial firm.[4] These three options include the flexibility of assigning the pump to one activity, the electric motor to another, or both motor and pump to the same activity. While considering the various options the Tycom-Rep is likely under pressure from both the shipyard and the ship's force. The shipyard states that they must do both or they "can't" be responsible for the total component testing, and will not guarantee repairs to the pump if they did not also overhaul the motor.

Ship's force contribution is that the repair work to the pump is beyond their on board repair capability. The problem of the Tycom-Rep faces is that both the shipyard and ship's force may have valid points. But he must also consider the big picture that the overhaul objective presents, the fiscal constraints of the overhaul and who is capable of doing what in terms of repair to the component. Additionally, the Tycom-Rep must consider several peripheral factors.

Any large amount of repair work screened to ship's force will require additional upkeep time that the operational schedule may not have available. Also additional OPTAR funding may be required to fund the additional work. If the work is screened to the Tender, the problems of scheduling and funding must also be dealt with for both the ship and the IMA. If a private commercial contractor is selected, the time

for processing the contractual documents, source of funding, transportation and availability of the ship must be carefully considered in arriving at the final decision.

In the case of the NR 1 Fire and Flushing Pump, repair is beyond the capability of ship force repair personnel. For the 5'54 MK 42 Mod 7 gun mount the options are:

(1) IMA remove and ship to the Refurb activity or the shipyard in advance of the ROH start date. In considering this option Fleet Approval must be obtained before the gun can be removed, as the ship will be severely limited in mission capability. The ship's operational schedule is very carefully evaluated and considered in the broader picture of the national defense posture.

(2) Leave the gun mount on board until the start of the overhaul, and have the shipyard perform the repairs.

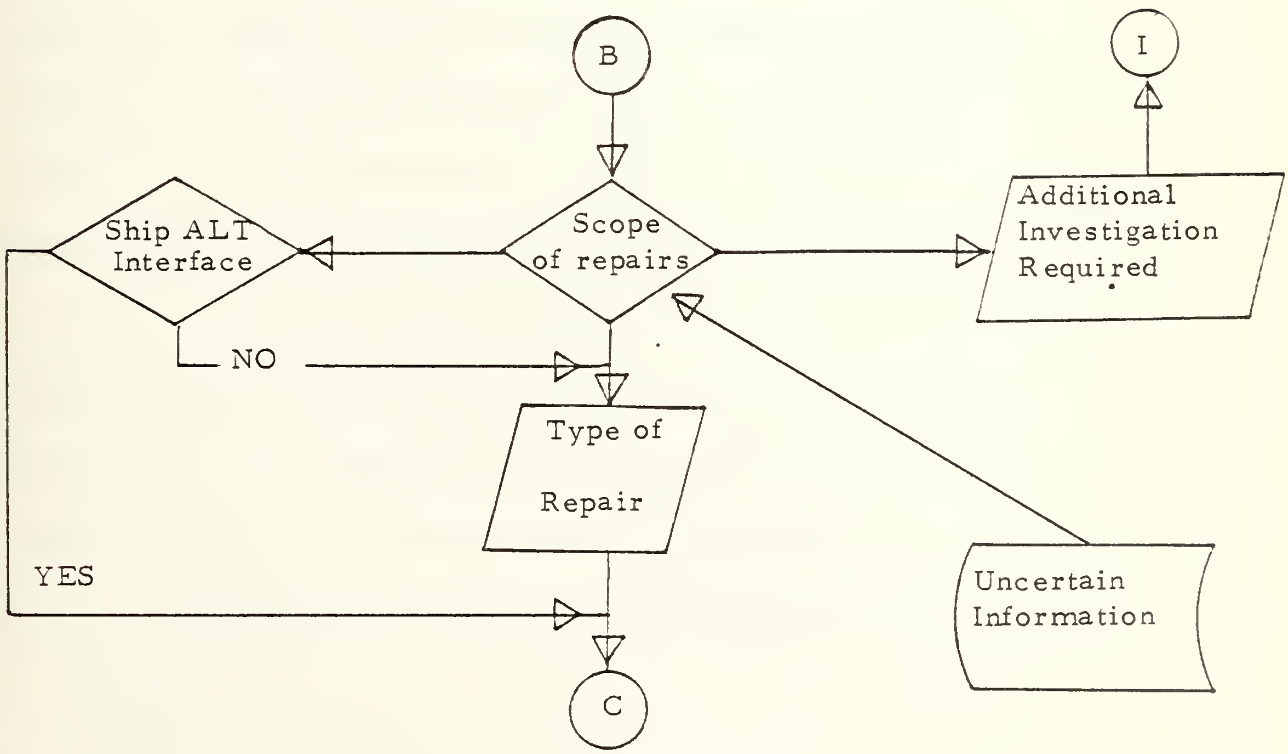
Regardless of the component under consideration, the Tycom-Rep must have a realistic appreciation and understanding of the repair capabilities of each maintenance echelon. For NR 1 Fire and Flushing pump the Tycom-Rep must be able to assess that the repairs are within IMA capability. However from past experience, the Tycom-Rep realizes that the intermittent heavy service these pumps are subjected to, combined with a less-than-ideal selection of pump casing material by the designer, has resulted in a situation wherein the casings have become severely eroded in the vicinity of the volute/wear-ring area.

Repair to the pump casing will require build-up of the eroded area by a controlled welding procedure and subsequent re-machining. As the Tycom knows of the limited success the IMA's have had in this type of repair, he regards the IMA to be a non-viable source of repair for the casing. However the repairs to the motor are well within the IMA capability, and that ship's force personnel can remove and deliver the motor on a ship-to-shop basis to the IMA.

Having completed the first two decision-categories and determined that; (1) repairs are required and (2) the appropriate maintenance echelon that can best accomplish those repairs, the Tycom-Rep is ready to enter the third-decision-category, which is represented graphically by Figure 3-7.

Figure 3-7

The Third Decision-Category Framework



The objective of the Third Decision Category is to determine the extent or scope of the required repairs, while balancing the Overhaul Objective primarily against the cost constraint, but also considering all the relevant constraints that may apply. These constraints will likely vary with each overhaul. Unfortunately this balancing ability cannot be expressed by a handy formula, or summarized by a convenient pocket guide, but must be acquired through experience gained by actually operating and overhauling ships.

When considering the scope of the repair required for a particular component, if the information is not descriptive enough to permit an objective decision as to the scope of required repair, the Tycom-Rep has two choices; (1) authorize repairs regardless of the actual material condition of the component perhaps spending repair dollars needlessly if the component doesn't require the scope of authorized repairs, (2) request the shipyard to re-investigate the component and present a meaningful repair recommendation as soon as possible to minimize the effects of late work authorization. No further action will be taken until the results of the re-investigation are known.

Additionally, when considering the repair of the component, the Ship ALT-Repair work package interface must be carefully evaluated for; (1) repairs to components that are required to support the installation and testing of the ship-alt installed equipment/systems (2) avoid repairing components that will be replaced entirely by a ship alt.

At this point, having determined that no additional investigation is required and that a ship-alt does not replace the component, the Tycom-Rep will determine the classification of repair to the component based upon the shipyard repair recommendation and his own experience and professional judgement. Most frequently the classification will be for Class B or Class C repairs,[1] depending upon the actual material condition of the component.

In the case of NR 1 Fire and Flushing Pump, the Tycom-Rep, based upon the outcome of the two preceding decision categories, will consider, (1) accomplish Class B repairs to the pump by the shipyard. The shipyard estimate calls for 50 man days at $146.50 per man day plus $1,850 for the repair parts. The total cost to repair the pump end is $9,175. The 100 HP electric motor will be removed and delivered to the IMA by ship's force personnel. The costs incurred to the tender are funded by the Type Commander separate from the overhaul funding. (2) Contract repairs to a private commercial firm. In the case of the pump, a southern-California based contractor can accomplish the desired repairs for about $5,500 dollars, based upon the severity of the pump casing erosion determined by the contractor's inspection of the casing. Since this is the least costly to repair, it is the option that the Tycom-Rep will choose, as it saves $3675, which can be spent for repairs to other components.

For the MK 42 Mod 7 gun mount, the problem of required repairs is simplified as the entire gun mount will be replaced by a Title K shipalt that installs a new MK 42 Mod 10 gun mount during the overhaul.

This third decision category is the most difficult to deal with when the realization occurs that the available funding is insufficient to accomplish all identified repairs. The Tycom-Rep must realistically acknowledge; (1) the tendency of previously unauthorized repairs to migrate back into the authorized repair package during the overhaul as legitimate and mandatory work required to successfully complete the overhaul becomes known; (2) that if the accuracy and thoroughness employed in identifying the recommended repair action does not reflect the actual condition of the component, once again money can be spent on doing more work than what is required to achieve the overhaul objective. The other side of this problem of balancing available funding against total identified work, is that false economies are often realized by attempting to do specific component repairs within a complex system. Due to this complexity, a repair to a specific component or module will likely require system alignment, calibration and testing. This may reveal additional repairs that must be made in order to complete the alignment, calibration and final testing of the system. The inevitable result of attempting too specific repair is growth beyond the authorized scope of repairs.

The forms of growth that may be encountered during the course of the overhaul are; (1) unanticipated growth and (2) anticipated growth. The former can best be defined as unanticipated emergent work originating from beyond the scope of authorized repairs to that component. An example of this type of growth would be if during the course of removing NR 1 Fire and Flushing pump it is noticed that the copper nickle fire main piping is severely pitted and will require replacement. This work was either not discovered during the POT-I or developed since the POT-I, but regardless of the cause, the work was not anticipated. The latter is emergent work that is anticipated or expected based on historical information and experience from previous overhauls. This type of growth occurs when the exact nature and magnitude of repairs cannot be fully determined during the Pre-Overhaul Process. Examples of this type of growth may be found in the boiler repair package where additional work may be discovered during course of accomplishing the authorized repairs. If as a result of analyzing the boiler tubes cut from a sample block of boiler tubes during the overhaul, it may be necessary to re-tube a boiler, work that was in general expected, but the extent was largely unknown.

Thus the classification of repair must be carefully evaluated by the Tycom-Rep considering the overhaul objective, the constraints and the possibility of growth and its potential adverse impact on the final cost of the overhaul. This effect of this impact can be measured by;

(1) the additional money that is required to fund the growth work experienced during the overhaul.

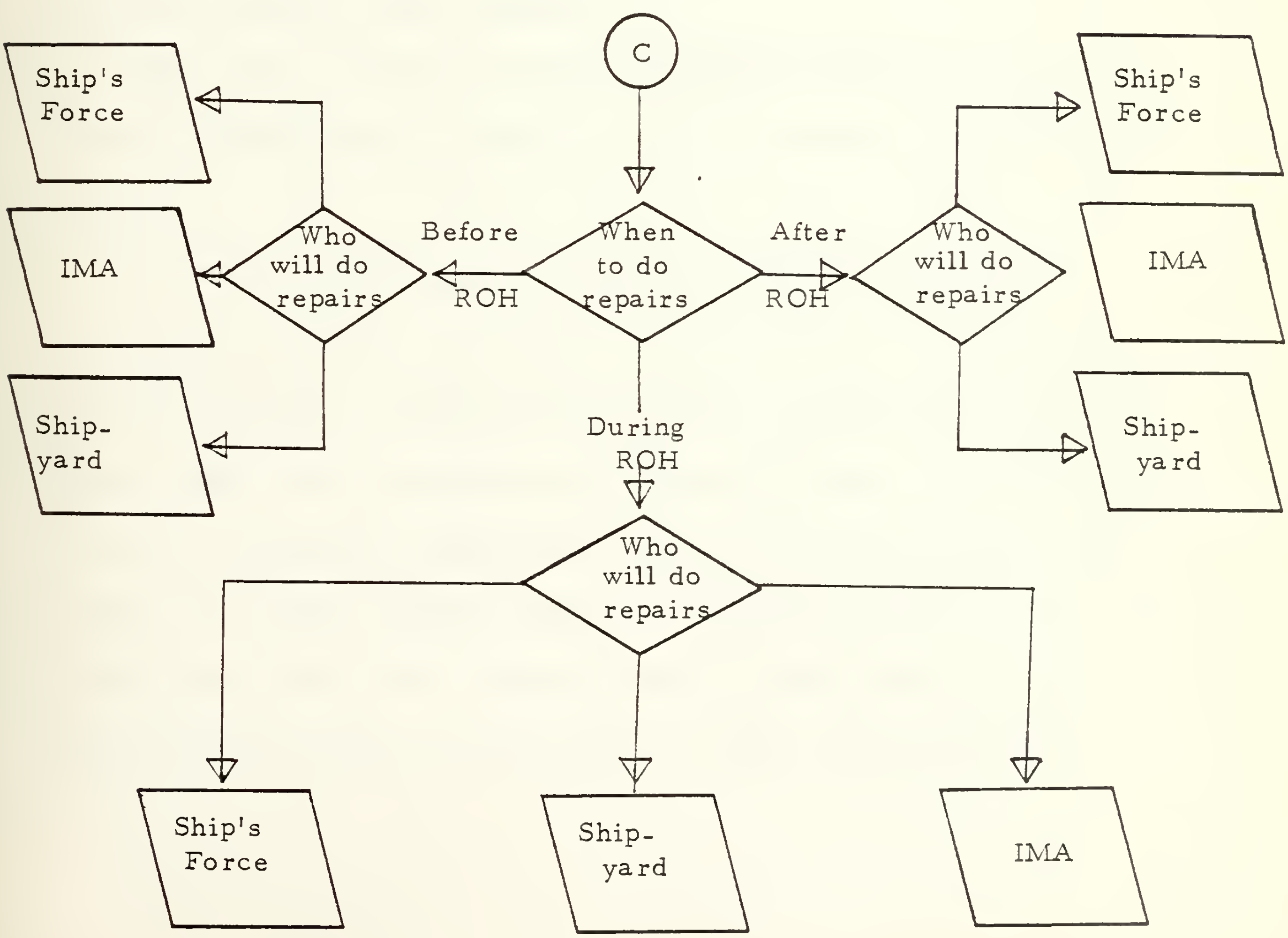
(2) the additional time that is required to complete the growth work may extend the overhaul completion date.

(3) the impact on other ships in overhaul (at the same shipyard) may be adversely affected by the reallocation of shipyard resources and priorities shifted to the ship in "trouble."

Having completed the third decision-category, the remaining two categories will be presented concurrently as depicted by Figure 3-8.

Figure 3-8

The Fourth and Fifth Decision-Category Framework



The objective of the fourth Decision-Category is to determine when to accomplish the repairs. After the overhaul is not a desirable time due to the ship's projected high tempo of operations in the post-overhaul operating cycle. Before the overhaul, the ship still must meet all assigned operational commitments. Both periods are essentially unavailable for performance of any amount of major repairs. The exceptions are (1) in the pre-overhaul period if the ship requires a maintenance period in which to perform emergent unplanned repairs caused by equipment casualties or other unplanned maintenance failures, (2) in the post-overhaul period the shipyard may be called upon to correct shipyard related repair discrepancies that are guaranteed for sixty days after the completion of the overhaul.

These repairs which are to be accomplished during the overhaul form the overhaul repair package and will be recorded in the authorized SARP.

The fifth Decision-Category identifies who will be assigned to accomplish the repairs; ship's force, an IMA activity or the shipyard. This determination is made by the Tycom-Rep considering the classification of repair from Decision-Category three, the repair capabilities and the type of component. This can be illustrated by considering the repairs to AN/R-1051 radio receiver, electrical switchboard meters and a forced draft blower. The R-1051 receiver requires specific Class C repairs, well within the capability of ship's force to repair. The switchboard

meters can be removed by the ship's force and delivered to the IMA for calibration. The forced draft blower requires extensive Class B repair and can best be done by the shipyard.

Returning to NR 1 Fire and Flushing Pump, the Tycom-Rep utilizing a least-cost-to-repair criteria decides to utilize the private contractor to overhaul the pump during the overhaul period and restore it to manufacturers specifications. The pump will be removed by ship's force during the first several weeks of the overhaul and delivered to the supply center for crating and shipment to the contractor's repair facility. Upon completion of repairs, ship's force will reinstall the pump. The electric motor will also be removed and delivered to the IMA on a ship-to-shop basis, by ship's force personnel.

The gun mount will be removed and the new mount installed by the shipyard during the overhaul period.

After an item is screened through the fifth Decision-Category the process is complete for that item, and screening the next item begins, until all components have been processed and the overhaul repair package has been defined and authorized. If after processing all the items in the proposed SARP, the dollar total exceeds the available funding, that work that has been authorized must be re-evaluated and items deleted from the shipyard authorized work package in order to stay within fiscal constraints. This once again requires the decision maker to carefully evaluate and balance the overhaul objective against the constraints.

The normative selection-decision process provides a basic framework that can be employed in defining the overhaul repair work package. However, it cannot provide a decision maker with THE answer as the problem varies from ship to ship, shipyard to shipyard, Tycom to Tycom, individual decision maker to individual decision maker, fiscal year to fiscal year, etc., to ad nauseum. The objective of this selection-decision process is to provide the decision-maker with a flexible framework or methodology that can effectively function in a changing environment and assist the decision maker in objectively screening and evaluating the overhaul repair work package. The determination of which requires continued tradeoffs between the hard to measure overhaul objective and the very measurable and prevalent constraints, as to achieve the maximum utilization of each repair dollar to get the maximum amount of repairs possible.

CHAPTER III

FOOTNOTES

[1] The following repair classifications are from OPNAVINST 4700.7E of 28 May 1975.

Class B repair: work which requires such overhaul or repairs as will restore the operating and performance characteristics of a system, subsystem or component to its "original" design and technical specifications. It is required to restore the operating and performance characteristics of an item to other than its original design and technical specifications, it must be so specified and the performance criteria defined. Ship ALTs, ORDALTs, field changes and modifications, even if applicable, are not to be accomplished unless specified by the customer. Maintenance adjustment and calibration routines specified by component authority are required, the repair activity will demonstrate that the end product successfully meets all performance criteria specified by the governing specifications.

Class C repair: work on a system, subsystem or component specified by the work request or that work required to correct the particular deficient conditions or malfunctions specified by the customer. The repair activity must demonstrate that the work requested has been accomplished or that the conditions/malfunctions described

have been corrected, but the repairing activity has no responsibility for the repair or proper operation of the associated components of the equipment or for the operation of the systems/subsystem equipment as a whole.

[2]The actual number of pages in the Proposed SARP and the number of items per page will vary caused by variation in the SARP format printing techniques and other administrative differences that exist among the various shipyards.

[3]In the "real world" it is very difficult to get a consolidated list of all the various refurbishment and maintenance replacement programs that various naval activities offer, for electronics, ordnance and engineering components.

[4]While the paper only considers Naval Shipyard overhauls, this does not preclude utilizing qualified civilian firms to accomplish repairs on a depot or intermediate maintenance level that are directly comparable to those found in Naval Shipyards or IMA's.

IV. THE ENVIRONMENT OF THE SELECTION-DECISION PROCESS

The normative selection-decision process provides the basic framework for the decision-maker to utilize in the complex reality of a "real world" environment. The complex reality encountered in the pre-overhaul process is a gray, poorly-defined area where the decision-maker is often required to anticipate potential problem areas in advance of their occurrence and be ready with a realistic and feasible solution when the problem occurs.

The organization of this chapter is based upon the analytic framework of the pre-overhaul process as depicted by Figure 3-1. Particular emphasis will be placed upon the selection-decision process and its major environmental elements.

The objective of this chapter is to present the major environmental elements that must be considered as peripheral considerations in the normative selection-decision process, presented in Chapter III.

The environment encountered in the Pre-Overhaul Planning Process is highly complex, interrelated and composed of many diverse, intangible variables.[1] In presenting the objectives, consideration will be focused upon the problem, not the subjective evaluation as to the definite cause of the problem. To become deeply involved in an investigation of the causal effects that are responsible for the partial failure of the

various managerial innovations, such as the CSMP/MDCS or POT-I, is beyond the scope of this paper. The author contends that any detailed investigation of these causal effects will still leave the problems unsolved in the short run, and will tend to obscure the problem at hand; the problem of how to define the overhaul work package.

There are many diverse and far ranging problems[2] concerning the quality of the CSMP/MDCS reports just as there are many problems with the scheduling, execution and quality of information from the POT-I. The author contends it would be naive to believe that any of the problems could be solved "if only". The problems do exist in the real world, they have been widely acknowledged by many top officials from the CNO, down to the Type Commander staffs. The problems have not yet been "solved," and in the author's opinion are not likely to be in the near future. The decision-maker in the Pre-Overhaul Planning Process must acknowledge the problems and accordingly begin his objective effort from a zero baseline to minimize the uncertainty originating from the various pre-overhaul events.

The greatest problem the Tycom-Rep faces is a lack of information, that prevails throughout the Pre-Overhaul Planning Process. The requirement for timely and accurate information is absolute. The CSMP Validation and POT-I Screening Conferences reflect the effort that should be undertaken[3] by a decision-maker to ensure that the detailed overhaul planning effort is based on reliable accurate and certain

information. The entire overhaul planning effort can be no better than the information it is initially based upon.

The price of minimizing the factor of uncertainty is considerable in terms of time, money and decision talent. A large amount of dedicated time must be spent by the Tycom-Rep reviewing each CSMP and POT-I prior to conducting the CSMP validation and the POT-I Screening Conferences.

Additionally, travel to the ship may consume several days depending on the ship's location, and each conference may consume several more days. The Tycom-Rep does not have the luxury of only having one ship to worry about during this time interval but frequently has several ships in various stages of the Pre-Overhaul Planning Process, in addition to his non-overhaul related staff duties. His decision making talent is challenged by having to evaluate the present information concerning the current material condition of the ship and project it forward six to nine months in time, anticipating problems and seeking their solutions. The decision maker must be ever mindful of the fiscal constraints of the overhaul, the potential effects of inflation, the availability of long lead time materials and the future cost of a bad decision made in the early phases of the Pre-Overhaul Planning Process.[4]

The Tycom-Rep, upon completing the CSMP and POT-I conferences must be confident that he has minimized the element of uncertainty surrounding the information regarding the actual material condition found

on board the ship. This validated information, along with the clearly defined overhaul objective and major constraints form the foundation for the Selection-Decision Process.

However, the problem of information still must be contended with by the decision-maker. Previously he has minimized the element of uncertainty surrounding the information concerning the material condition of the ship. Unfortunately, this fails to solve the full range of the problem that results from a lack of information. The other major aspect originates the situation: given the proposed overhaul work package, the overhaul objective and constraints, what are the options or alternatives that exist for the decision-maker to employ within the normative Selection-Decision Process in order to derive the authorized overhaul work package?

The peripheral considerations will be sequentially presented commencing with the first decision category of Chapter III. These peripheral factors are caused by a lack of information concerning the various alternatives or options that exist and can be utilized during the Selection-Decision Process.

The Tycom-Rep in determining the necessity of repair within the First Decision-Category must deal with two primary types of uncertainty. The first is the human aspect that must consider factors such as personality, attitude and communication. The second is caused by a lack of a definitive document listing all available maintenance replacement and refurbishment programs that currently exist.

As discussed previously in Chapter III, the Tycom-Rep will be subjected to pressure from the ship's force. The amount of previous involvement with the ship's force personnel greatly assists the decision maker in ascertaining where the ship's force personnel are "coming from" and evaluating the human element. However, due to such factors as personnel transfers, manning deficiencies, lack of experienced on-board personnel, this element must be continually evaluated - and updated by the Tycom-Rep.[5] At the time of the Work Determination Conference, and utilizing the Normative Selection-Decision Process, the Tycom-Rep must be acutely aware of the level of ship's force knowledge of the ship and all shipboard related systems. This knowledge must be able to fill the gap between the information reported in the POT-I on a component or subsystem level to the operation of the total ship system. The POT-I reports component deficiencies by system but does not answer questions such as; what happens to system X if component A1W fails in System Y? Additionally several months lapse from the execution of the POT-I to the Work Determination Conference. The Tycom-Rep must depend upon ship's force to identify and document new discrepancies that arise in the interim.

Additionally, the Tycom-Rep must attempt to determine the underlying cause or source of this ship's force pressure in the First Decision-Category. It may be caused merely by a desire or bias to restore the ship to a like new condition or may be the result of honest and forthright

appraisal of their own limitations and capabilities for a massive onboard repair effort.

The author believes that the only plausible solution to this particular problem is for the Tycom-Rep to know and develop a working relationship that includes positive feedback to minimize surprises at any stage of the Pre-Overhaul Planning Process,[6] combined with an understanding that all of the identified work cannot be accomplished during the overhaul.

The other major player, the shipyard, does not present any major unpredictable problems. The shipyard inevitably seeks a tight well defined work package with a minimum of overlapping responsibility that generally would require several million dollars more than what is available. This problem is generally resolved by spirited and prolonged negotiation during the course of the Work Determination Conference.

The second major type of uncertainty in the first Selection-Decision Category is due to the difficulty of finding out what various maintenance replacement or refurbishment programs exist, the program manager, the type of funding required, the requirements of a particular program and the current status of that program. Examples of well known programs include:

(1) NAVSHIPSINST 9400.15C of 27 Aug 1971 that deals with the ship's propellers and propulsion shafts; repair preservation, packing, marking inspection and storage procedures.

(2) COMCRUDESLANT INSTRUCTION 7110.1A of 25 Feb 74 that provides information concerning Other Procurement, Navy (OPN) funding for investment-type equipment such as Industrial Plant Equipment (IPE) and Operating Forces Support Equipment (OFSE).

(3) ESO Instruction 4400.9B of 13 Mar 72 that delineates Policies and Responsibilities for Handling General Purpose Electronic Test Equipment (GPETE) and Teletype Equipment (TTY) 4 cognizance.

However many times initial knowledge of a program is gained from a message such as NAVSHIPSYSCOMHQ Washington 201718Z Nov 73 that provided, via a message readdressed to the various COMCRUDES-LANT Mat Reps, the initial knowledge that evidently resulted in an acceptable weld repair of bronze alloy pump casings by a west coast civilian contractor at a fair and reasonable price. The author believes that a vast amount of information of this type is not readily available to the decision-maker in the field. The Tycom-Rep must develop his range of available options or alternatives, based upon (1) a fair amount of "detective work" in tracking down a particular program in a vast bureaucracy of government agencies, (2) exchange of information with other decision makers, and (3) updated information concerning the current status of the program. By actively seeking out the various available programs the decision-maker has a wider range of options available to consider in the Normative Selection-Decision Process. By expanding this range of options, the decision-maker is able to utilize

a least-cost-to-repair criteria, that will assist in achieving the maximum amount of repairs, given a fixed amount of funding.

When the decision-maker moves to the Second Decision-Category he endeavors to determine who can do what, in terms of repair accomplishment. This requires the Tycom-Rep to sort "the wheat from the chaff," by utilizing his knowledge of the repair capabilities of the various maintenance echelons, and evaluating the human aspect as previously discussed. The decision maker must additionally take into account several additional peripheral considerations. These peripheral considerations can directly influence a decision outcome. They require minimizing the uncertainty of information regarding (1) scheduling and (2) funding.

Scheduling, or time and funding may be considered together as one problem. Before any large amount of work can be assigned to the ship's force personnel, IMA activity or civilian contractor, time and money must be available and committed to that ship for the work. If these two resources, time and money, are not available the effect will be to assign work without providing the time or money to accomplish that work. The rational decision-maker can readily see that is clearly not the way to accomplish any meaningful amount of maintenance that would improve the ship's material condition. If maintenance is to be looked at in total the ship's force and IMA packages should be viewed with equal importance as the shipyard portion and accorded the same

probability of accomplishment by providing the method of accomplishment; time and money.

The problems encountered in the Third Decision-Category are similarly caused by a lack of information that introduces the element of uncertainty. In the case where the shipyard repair recommendation is not descriptive enough to permit an objective decision by the Tycom-Rep, he has but two choices as previously discussed in Chapter III. However, in order to form the work package and not delay the overhaul planning effort the decision-maker has one interim option available. That is to set aside an amount of money that is estimated to be required to do that job, when the full scope of repairs is determined by the shipyard re-investigation. This estimate is often informally referred to as "Class F" or "stab" estimates and are based upon historical costs to do a similar job. To employ this option requires experience and a knowledge of past costs to perform similar jobs. This is an area where no centralized data exists, except in the form of shipyard departure reports; a shipyard originated document that records the costing information of a particular ship's overhaul.

Considering the Shipalt-Repair work package interface, several problems become apparent. The General Accounting Office (GAO) recently reported to Congress that the Navy cannot accurately plan for future alterations because it lacks a system to show the completed and outstanding alterations for each ship. The Ship Alteration Management

Information System (SAMIS) is not working efficiently [7]. Data has been found untimely, inaccurate, incomplete or a combination of these deficiencies, the GAO report concludes. The net effect is to introduce uncertainty into evaluating the ship Alt -Repair package interface. Specifically each ShipAlt must be addressed separately as to its status; accomplished, partially accomplished, or not accomplished and what specifically is removed, added to or integrated into existing, on board components, subsystems, or systems. A recent case of what can happen if the Ship Alt status is not accurate was encountered on a FY 77 East-Coast destroyer overhaul. The Ship Alt required modification to the main engine steam turbines. This required the steam turbine casings to be lifted. When the casings were lifted, the Ship Alt in question was found to have been previously accomplished. The result was several hundred thousand dollars needlessly spent. The cost of this gross lack of information clearly speaks for itself.

Within the fourth and fifth Decision-Categories the problems of time and money are again intertwined. The shipyard portion of the overhaul is clearly defined by the length of the overhaul period and the level of funding. The finite amount of shipyard overhaul effort that can be accomplished is a function of the available time and money. Similarly, the ship's force and IMA work packages are constrained as to when and who can accomplish the assigned work and what additional resources, time and money will be required to support that effort.

In the pre- or post- overhaul period, the uncertainty concerning the operational aspect of the ship makes it difficult for the decision-maker, the ship's force and the IMA rep to program any meaningful effort to correct and reduce their assigned overhaul work packages.

Accordingly, a tendency has prevailed in the past to assign more work to forces afloat than they have resources available to support. This represents an unrealistic approach to solving the problem of deferred maintenance. Merely assigning all the work to forces afloat that cannot be accomplished in the shipyard portion of the overhaul work package does not ensure that it can or will be done. The constraints of time and money still predominate. Ship's force or IMA cannot do more work than available resources permit. The physical accomplishment of any job is directly related to the available resources. An Optar augmentation of 25,000 dollars, a 10,000 dollar Assist Ship's Force[7] Fund and a concurrent IMA availability limited to X man-hours per week is not sufficient to accomplish the equivalent of several million dollars worth of shipyard repair work during the same length of time. This tendency of assigning unrealistic amounts of work to ship's force still prevails and will continue as a basic problem. The author believes this trend will prevail as there have been no changes that would serve to minimize this problem. This belief is based upon (1) the advantages of larger overhaul budgets have largely been offset by the effects of inflation, (2) the trend towards providing management of the ship's

force work load (SFOMS) when what is actually required is a realistic plan of action for reducing that work load.

In summary, the formulation of an overhaul repair package depends to a large degree upon utilization of a systematic thought process by the decision maker. This thought process must consider an environment that can be defined by many various definitions. The adage of "where you stand depends where you sit" is especially apropos. The Normative Selection Decision Process of Chapter III and its environmental aspects of this chapter, represent one thought process and its major environmental considerations. There is no one right way to get the job done, but there are many pitfalls that await the inexperienced, the unwary, the careless, and the indifferent. The information presented in this paper can be used to assist the decision-maker in his difficult job of minimizing the uncertainty of his environment.

CHAPTER IV

FOOTNOTES

[1]Typically a list of these variables would include such factors as the attitude of ship's force toward CSMP/MDCS documentation, the morale of the crew, the ability and motivation to maintain their ship and the general repair attitude of the IMA (i. e., a can-do spirit). Also the amount and degree of communication and cooperation must be considered. These factors all have one basic similarity in that they are very difficult to identify and attempt to manage. This is by no means a comprehensive listing of all possible variables but merely a few of the more obvious.

[2]These problems differ, according to the participants in the Pre-Overhaul Planning Process and the set of prevailing circumstances. They typically range from the various problems a ship force encounters in attempting to document the PMS/MDCS requirements and include quality of documentation through the various difficulties encountered in attempting to get the computer output back to the ship. Additionally these problems include the POT-I techniques, quality and experience of the shipyard inspectors, time and scheduling considerations. There is no one list of discrepancies that apply to all ships for all overhauls, rather each individual overhaul is an occurrence with its own unique problems and should be approached accordingly.

[3]The current trend is for the Type Commanders to utilize PERA (CRUDES) to conduct the CSMP and POT-I conferences. The author strongly believes while this is good in the short run (it's better than not conducting the conferences) it has detrimental long term effects by tending to isolate the Type Commander from the realities of the "real world" pre-overhaul planning environment.

[4]A "bad" decision would be one that would have potential impact upon the timely and successful completion of the overhaul. An example would be to decide not to order additional long lead time material that may or may not be required for a job. In the case of the boiler work package, this would be no ordering additional super heater tubes, when the possibility exists that when the sample tubes are analyzed more tubes will have to be replaced than originally anticipated. If the tubes are not available (they are long lead time items) the potential impact is delay of the overhaul completion date.

[5]In the surface community, it is not uncommon for the Commanding Officer, Engineering Officer and other key personnel to be relieved or transferred at inopportune times during the Pre-Overhaul Process or The Overhaul. This loss generally results in a discontinuity of managerial expertise, until the new personnel are "up to speed."

[6]The working relationship would permit a free flow of information and would preclude surprises such as ship's force reporting after the overhaul, that more new work was required but they had not previously told the Tycom-Rep. On one of the author's overhauls, a visiting

Admiral from Washington while conducting an "informal" inspection on the ship, in company of the Command Duty Officer, a young JG, discovered from talking to a Chief BT that the ship had over 300 work requests for shipyard accomplishment that had not been submitted to Type Commander for screening. This incident occurred 3 months after the overhaul start date. There was no additional overhaul money available, so the money for the new work had to be from existing funds. This was accomplished by re-evaluating the entire work package, prioritizing all work and reauthorizing approximately 80 percent of the entire work package.

[7]Assist Ship Force in an amount of money given the ship's Commanding Officer to spend in the shipyard to buy shipyard assistance to aid the ship's force repair personnel, if a particular aspect of a ship's force job is beyond their capability.

V. CONCLUSION

The size and cost of an overhaul repair package is continuously and rapidly increasing. This trend is causing longer and more expensive overhauls. The author believes the primary causes of this trend to be;

(1) The effects of inflation as reflected in higher shipyard labor rates and increased material costs that cannot be budgeted[1]

(2) The task of identifying specific material discrepancies is rapidly becoming more difficult as the complexity of ship systems continues to rapidly respond to the advancing technology called for by the Fleet Modernization Program. This program calls for the new components/systems to be installed, integrated or interfaced with the older existing onboard systems. The task of accurately and thoroughly defining the overhaul work package becomes more difficult, time consuming and expensive.

(3) The amount of work that must be accomplished in future overhauls that has been either deferred in previous overhauls or from complete ship overhauls that have been deferred (as of 19 Jan 1976 there were 63 deferred overhauls) due to a lack of room in the shipyard due to heavy shipyard work loading, or lack of overhaul funds in the Navy's overhaul account.

The present Pre-Overhaul Planning System is adequate for meeting any demands placed on it by future overhaul requirements. The job ahead as the author envisions it, is to strengthen the existing system, not to establish newer, more complex systems. This effort must occur on the operational level with assistance from above in the form of review and guidance. The effort to improve the present system should be a continuous process based upon timely feedback of the current environment and should retain a high degree of flexibility to adapt to that environment. As the actual evaluation of effectiveness of the Pre-Overhaul Planning Process can only be determined when the overhaul is complete, the obvious solution would be for PERA to conduct a Post Overhaul Critique (POC). The purpose of this critique would be to formally determine what improvements or modifications could have improved the effectiveness of that overhaul. The relevant information from the Post-Overhaul Critique would form the feedback, that would be utilized by the PERA organization, the shipyard and the Tycom to improve the Pre-Overhaul Planning System for follow-on overhauls.

Repair dollars are a valuable resource and must be spent effectively so as to achieve the maximum amount of repairs per dollar. It is fair to say in the author's opinion, that in the near future, to preserve this valuable resource, more of the overhaul repair decisions will be made utilizing the selection of the least-cost-to-repair criteria.

The Pre-Overhaul System cannot function independent of human management. Any system requires involvement of dedicated and experienced personnel who realize that the system is a managerial tool, not the absolute solution to an array of complex problems. The three primary causes of the trend of larger, more expensive overhauls indicate to the author, that a serious imbalance exists between managerial and technical expertise. The Navy faces the very real and serious risk of not being able to afford to overhaul its ships, so as to achieve the overhaul objective and improve fleet readiness. Admiral Bernard A. Clarey, former Vice Chief of Naval Operations, observed that: "Engineers are engineers because they have a great affinity for technical work. However, the most capable of engineers is of little avail in our complex environment unless his efforts are logically meshed with the efforts of others. Management provides this intermeshing. The technical aspects of the product are bound to benefit from better management." [8]

The complete solution to the problem of improving the material condition of a ship or fleet, is beyond the Pre-Overhaul Planning Process and must include more than just pure maintenance alone. The problem is one of improving fleet readiness. Admiral Holloway, Chief of Naval Operations, defined fleet readiness to be the ability of the fleet to successfully carry out those responsibilities for which the Navy has been charged in support of our national security plans. [9]. This ability is dependent upon many factors which include personnel,

training, maintenance, and material management. CNO's objective three deals with the development of a comprehensive program to promote an early improvement in the fleet's material condition. Currently there are twenty-one initiatives covering these factors. They are being monitored by the ship's material condition steering group.

The author believes the complete solution, if indeed there is one, will be slow in arriving due to the complexity and magnitude of the solution.[2] Major programs solving the far-ranging problems of personnel, training maintenance and material management cannot be implemented in a short time frame. The successful implementation will take several years to achieve. Due to the difficulty in measuring the increased or improved fleet readiness resulting from the solutions to the problems of personnel, training, maintenance and material management, it will be hard to determine when "The Solution" has been achieved. The author's observation as to when "The Solution" will be achieved is that if any of the various programs become intangled with a rigid and inflexible bureaucracy, "The Solution" would most likely never be fully achieved. Meanwhile the attitude of having more Sea Power not only by having more new and expensive ships, but also by having better overhauls and looking at maintenance continuously and in total must continue to prevail until "The Solution" is fully achieved and successfully implemented throughout the fleet.

CHAPTER V

FOOTNOTES

[1]The Office of Management and Budget requires that we budget for known prices. We are not allowed to estimate inflation for OM&N accounts. We can estimate the man days, work at the man-day rate of the shipyard and estimate the cost of materials. These estimates are made some 15 months in advance of when we are going to spend the money. The economics of this problem are such that if a 10 dollar increase in the man day rate would result in 500,000 dollar increase for a 50,000 man day overhaul. No additional work or benefit is obtained from this increase. The Navy has attempted to get this problem solved, but the OMB made the decision that the Navy will not budget for inflation.

[2]Suggested topics for future research that will aid in achieving the complete solution include such varied topics as;

1. Investigation of the CSMP to determine methods of improvements.

2. A cost-benefit analysis of the feasibility of overhauling ships utilizing the methodologies employed in the ship modernization program.

3. Investigation of the optimal overhaul cycle length.

4. Investigation of optimizing current overhaul budget procedures and techniques.

5. SupShip vs. Naval Shipyard Overhauls, an economic analysis.

6. Least-Cost analysis of repairs utilizing civilian contractors.

7. Investigation of IMAs to determine utilization efficiency.

8. Determination of the feasibility of centralized data bank maintained by PERA and containing historical and current overhaul information.

LIST OF REFERENCES

1. McArthur, J. C., CDR, USN, "Advanced Management Techniques Used to Develop Ship Improvement Program," Navy Management Review, Vol. XIII, No. 10, p. 7, October 1968.

2. House, M. E., LT, USN, Working Papers, Information compiled while serving on COMCRUDESLANT Staff Jan 72-Aug 74.

3. Department of the Navy, Program Objective Memorandum FY 1977 Annex D, Ship Maintenance and Modernization Program.

4. Office of the Chief of Naval Operations, OPNAVINST 4700.7E of 28 May 1974.

5. Naval Sea Systems Command Technical Specification 4720-202, PERA Technical Specification, SHIP Alteration and Repair Package, 1 April 1975.

6. Office of the Chief of Naval Operations, OPNAV INST 3540.4 of 19 Nov 1972, Establishment of 1200 PSI Propulsion Examining Boards.

7. Jarvis, Alan, "GAO Criticizes Fleet Overhaul Program," Navy Times, Vol. No. 26, page 8, 12 April 1976.

8. CLAREY, Bernard A, ADM, USN, "The Urgency of Excellence in Management," Navy Management Review, Vol. XIV, No. 9, p. 14, September 1969.

9. Hearings on Fleet Readiness before the Subcommittee on Seapower and Strategic and Critical Materials of the Committee on Armed Services, House of Representatives, Ninety-Fourth Congress, Second Session H. A. S. C. No. 94-37, Hearings held 19-23 Jan 1976.

BIBLIOGRAPHY

Bussert, James C., STCM, USN, "Chronological Review of the 3-M," NAVSEA Journal, Vol. 24, p. 28-35, August 1975.

Clarey, Bernard A., ADM, USN, 'The Urgency of Excellence in Management," Navy Management Review, Vol. XIV, NO9, p. 14, September 1969.

Felger, Daniel G., LCDR, USN, "The 1200-Pounders: Prognosis Guarded," United States Naval Institute Proceedings, Vol. 100, p. 60-68, April 1974.

Jarius, Alan, "GAO Criticizes Fleet Overhaul Program," Navy Times Vol. No. 26, page 8, 12 April 1976.

Jurges, Glen F., "Risk Management Keeps Aircraft Carrier Overhaul Planning on Schedule," Naval Engineering Journal, Vol. 85, p. 13-24, October 1973.

Kaune, James E., CAPT, USN, "Changing Shipyards to Improve Cost Effectiveness of Ship Maintenance," Naval Engineers Journal Vol. 88, p. 234-244, April 1976.

Kern, Donald K., CAPT, USN, "Planning and Engineering for Repairs and Alterations (PERA)", Naval Engineers Journal, Vol. 81, p. 28-32, December 1969.

McArthur, J. C., CDR, USN, "Advanced Management Techniques Used to Develop Ship Improvement Program," Navy Management Review, Vol. XIII, No. 10, p. 7, October 1968.

McClelland, Arthur T., "Ship's Force Overhaul Management System (SFOMS)", Naval Ships Systems Command Technical News," Vol. 20, p. 11-16, November 1971.

Neate, J., "Data Summary and Results on Candidate Equipments for Maintenance History Analysis, Overhaul Planning and Engineering for USS TOWERS DDG-9," prepared for PERA (AAW) under Contract Number N00140-73-D-0074, February 1973.

Piersall, Charles H., CDR, USN, "A Profile of the Ship Overhaul Program," Institute of Naval Studies, 178-71, 6 July 1971.

Ruska, Walter E., LT, USN, "The Shipboard Engineering Crisis," United States Naval Institute Proceedings, Vol. 102, p. 101-103, January 1976.

Steward, Paul E., LTJG, USN, "The 1200-Pounders: Further Prescriptions," United States Naval Institute Proceedings, Vol. 101, p. 101-103, January 1975.

Walden, Dave D., "Systems Management of Complex Overhaul Programs," Naval Engineers Journal, Vol. 81, p. 33-36, December 1969.

Center for Naval Analyses, Current Methods Used in Ship Alteration Priority Process, by James L. Cotton, LCDR William L. Fulton, and CDR Charles H. Piersall, p. 2-21, 17 April 1972.

Office of Naval Research, Reducing the Cost of Navy AO Overhauls: Phase II of the SOAMS Project by Herbert F. Mills, Gershon Cooper and Bernard N. Samers, p. 2-65, 31 July 1974.

Center for Naval Analysis, Determination of Fleet Modernization Ship Configuration - FLT MOD Study 1001, James L. Cotton, CDR Charles H. Piersall, LCDR William L. Fulton and James R. Harrington, p. 2-18, 14 March 1973.

Center for Naval Analyses Study 1034, Draft Report of Ship Overhaul Cost Estimating Relationships (SOCER) Study, John Buchanan, LT C. F. Snyder, Jo Anne Deckert, Richard UN. Wilson, Mary Etwards p. 1-20, 27 December 1974.

Department of the Navy, Program Objective Memorandum FY 1977 Annex D, SHIP Maintenance and Modernization Program, Office of the Chief of Naval Operations, OPNAV Inst 4700.7E of 28 May 1974.

Naval Sea Systems Command Technical Specification 4720-202, PERA Technical Specification, Ship Alteration and Repair Package, 1 April 1975.

Hearings on Fleet Readiness before The Subcommittee on Seapower and Strategic and Critical Materials of the Committee on Armed Services, House of Representatives, Ninety-Fourth Congress, Second Session H.A.S.C. No. 94-37, Hearings held 19-23 Jan 1976.

Office of the Chief of Naval Operations, OPNAVINST 3540.4 of 19 Nov 1972, Establishment of 1200 PSI Propulsion Examining Boards.

OPNAVINST

03120.24E	- AS(FBM) Employment and Overhaul Plan (U)
4700.8F	- Trials, Acceptance, Commissioning, Shakedown and Post Shakedown Availability of U. S. Naval Ships Undergoing Construction/Conversion/Modernization
4700.9A	- Ships Assigned to MSTS; responsibility for Technical and Material Matters
4710.29P	- Pacific Fleet Overhaul Schedule
4710.30P	- Atlantic Fleet Overhaul Schedule
4720.2D	- Fleet Modernization Program Planning Procedures
04720.73B	- SSN Overhaul/Improvement Plan (U)
4730.5H	- Material Inspections of Ships Conducted by the Board of Inspection and Survey
04730.7	- Material Inspection of SSBN Submarines (U)
4730.5H	- Material Inspections of Ships Conducted by the Board of Inspection and Survey (INSURV)
4780.6A	- Procedures for Administering Service Craft and Boats in the U. S. Navy
4790.4	- Ships' Maintenance and Material Management (3-M) Manual
4790.5	- Fleet Maintenance Assistance Groups (FMAG); general policies concerning
4860.5A	- Use of contractor and government resources for maintenance of material; policy and procedures for
4900.79	- Tender work for Foreign Ships
5040.7F	- Naval Command Inspection Program
5040.12A	- Naval Command Inspection Program for Forces Afloat
5450.176	- Chief of Naval Material; mission and functions of

APPENDIX A

SHIP OVERHAUL SCHEDULING

1. General. Ship overhaul and scheduled restricted availability schedules shall be prepared in accordance with the basic cycle of events listed in Tab A and promulgated by OPNAV Instructions 4710.29P, subject: Pacific Fleet Overhaul Schedule and 4710.30P, subject: Atlantic Fleet Overhaul Schedule, for the Pacific and Atlantic Fleets, respectively, for the next fiscal year and for each of the five years of the Program Objectives Memorandum (POM) planning cycle. Basically, each ship will be scheduled for overhaul on the basis of the policy on ship operating intervals and overhaul durations prescribed by Tab B. With the exception of nuclear powered submarines, operating intervals shall commence on the completion of the post-shakedown availability of a newly constructed or converted ship, or at the end of a regular overhaul. The operating intervals for nuclear powered submarines shall commence on the completion of fitting out for a newly constructed or converted submarine, because of the special safety consideration, or at the end of a regular overhaul. Changes to the operating intervals should be made based upon the material condition of the ship. For example, it may be possible to increase the operating interval as a result of a long restricted availability. Conversely, it may be necessary to decrease the operating interval of a particular ship based on the anticipated material condition of the ship at the time it will commence overhaul.

2. Schedule Changes. Fleet commanders in chief may find it necessary to recommend changes to the overhaul schedules for operational reasons; however, such changes must be held to an absolute minimum in order to avoid workload disruption in repair activities and hence extra costs. In the event it becomes necessary to revise the schedules, the following procedures shall be followed:

a. For regular overhauls and selected restricted availabilities, fleet commanders in chief are authorized to delay or advance scheduled starting dates up to five weeks and delay completion dates up to five weeks if the Naval Shipyard Commander or Supervisor of Shipbuilding, Conversion and Repair concerned concurs and if the modified starting dates stay in the same fiscal year as the original dates. Availabilities may be terminated early at the discretion of the fleet commanders in chief (see enclosure (5) for complex overhauls).

b. For post-shakedown availabilities (PSA), fleet commanders in chief are authorized to delay or advance scheduled starting dates up to three weeks if the Naval Shipyard Commander or Supervisor of Shipbuilding, Conversion and Repair concerned concurs. Completion dates may likewise, be delayed up to three weeks providing the SCN funding and work limit date is not exceeded. As a general rule, it is not expected that higher authority (above the CNO) will waive this cut-off date; therefore, it is most important that adequate time be allowed between the planned completion date and the SCN cut-off date to allow for unforeseen delays and additional work that may be required. Any correspondence relating to PSA schedule changes must contain the SCN cut-off date.

c. For inactive ships, the Chief of Naval Material (Commander Naval Ship Systems Command) may advance or retard the beginning or termination of a scheduled inactivation availability provided that the modified starting date falls within the same fiscal year as the original date.

d. Recommendation for a change not authorized in the above paragraphs shall be referred to the Chief of Naval Operations with information copy to the Commander, Naval Ship Systems Command, by the cognizant commander, citing the reasons. Changes in overhaul schedules shall be minimized and must be consistent with operational requirements, sound maintenance policy for the Fleet, and effective management of the shipyard industrial complex. Further, complex overhaul schedules shall be maintained so that requirements of enclosure (5) (complex ship overhaul procedures) can be met in a timely manner. Cognizant commanders will, by information copies of pertinent correspondence, keep the Chief of Naval Operations, the Commander, Naval Ship Systems Command and other interested commands advised of all date changes authorized in accordance with paragraphs 2.a., b. and c. above.

e. A request to change the scheduled locationof an overhaul, selected restricted availabilities or post-shakedown availability shall be referred to the Chief of Naval Operations by the Fleet Commander in Chief or the Commander, Naval Ship Systems Command, making the other an information addressee and citing the reasons for the requested change. The information addressee shall provide concurrence or comments to the Chief of Naval Operations. Normally change in location of a complex overhaul will not be authorized in view of the early commitments that must be made per enclosure (5).

f. The Naval Ship Systems Command and other cognizant systems commands shall be kept apprised of all restricted availabilities granted and significant changes made thereto. The Chief of Naval Operations should be an addressee only if the availability is of special interest.

3. Criteria for assignment to overhaul activity. Assignment of an availability to a specific ship in a naval shipyard or under a Supervisor of Shipbuilding, Conversion and Repair will be based on material readiness requirements and technical considerations, as well as the following guidelines:

a. Maximum consideration, consistent with yard qualifications and specializations, shall be given to overhaul in or near home ports.

b. Ship overhauls, restricted and technical availabilities, industrial assistance in connection with activations, repair and overhaul of service craft and ships of the Security Assistance Program will be assigned to shipyards (naval and private) that are properly qualified for such work.

c. Overhauls of nuclear powered ships will be assigned only to shipyards qualified in nuclear ship overhauls. Tenders fitted for nuclear support may be overhauled at non-nuclear qualified shipyards, subject to the concurrence of Commander, Naval Ship Systems Command.

d. In determining the geographic area from which bids will be solicited for the industrial work, the Chief of Naval Material (Naval Ship Systems Command) will be guided, subject to the requirements of the Armed Services Procurement Regulations, by the following criteria:

(1) Restricted and technical availabilities should be accomplished in locations which meet the requirements of the Commander assigning the availability.

(2) Regular overhauls of ships and service craft having crews attached should be accomplished in the homeport area when adequate competition is available there. When adequate competition is not available in the specified homeport area, the bidding area shall be extended the minimum automobile travel distance necessary to assure adequate competition. When bidding is opened to an extended area outside the homeport area, such personnel expenses as payment of family separation allowance and travel back to the homeport for the crew which are payable under current regulation shall be included in the foreseeable costs considered in evaluating bids in accordance with the Armed Services Procurement Regulations and the Ship Repair Contracting Manual.

If in order to obtain adequate competition it is necessary to extend the bidding area to points more than 200 road miles from the homeports, this shall be done only with the agreement of the commander who is authorized to make a determination of "military necessity" to justify restricting the bidding area.

(3) "Split bidding" (division of work on a single ship into two or more packages) may be utilized to enhance competition where appropriate and when circumstances permit. Some other factors which must be considered in a decision to use "split bidding" are the effect on the welfare of the ship's force and any extension in duration of overhaul required. The Fleet Commanders in Chief or Type Commanders may specify that operational or military requirements necessitate accomplishing the work as a single package. These requirements should be complied with insofar as feasible.

(4) Unusual situations or disagreements under the foregoing criteria shall be referred to the Chief of Naval Operations.

APPENDIX B

SHIP MAINTENANCE RESPONSIBILITIES, FUNCTIONS AND IMPLEMENTATION

1. SECNAVINST 5400.13, subject: Assignment and Distribution of Authority and Responsibility for the Administration of the Department of the Navy, assigns to the Chief of Naval Operations (CNO) the responsibility to maintain the readiness of Navy forces. Included therein is the responsibility for planning and determining the material support needs of the Operating Forces of the Navy (less Fleet Marine Forces and other assigned Marine Corps Forces), including equipment, weapons and weapon systems, material, supplies, facilities, maintenance and supporting services. This responsibility includes, in part, the determination of the order in which ships and surface craft are to be maintained, altered, repaired and overhauled. DOD Directive 5030.9 of 19 January 1972, subject: Coordination of Shipbuilding, Conversion and Repair for the Department of Defense (promulgated by SECNAVINST 4700.6, same subject), assigns responsibilities to the Chief of Naval Operations relative to the coordination of shipbuilding, conversion and repair for the Department of Defense.

2. OPNAVINST 5450.176, subject: Chief of Naval Material; mission and functions of, assigns the Chief of Naval Material (CHNAVMAT) responsibilities for meeting the material support needs of the Operating Forces of the Navy for equipment, weapons and weapon systems, material, supplies, facilities, maintenance and supporting services, including, in part, the maintenance, alteration, repair and overhaul of ships, surface and undersea craft equipment, all consistent with approved programs. OPNAVINST 4720.2D, "FMP Planning; procedures for," further details Fleet Modernization Program responsibilities. The CHNAVMAT is responsible for maintenance within the Naval Material Command and for the accomplishment of maintenance by the systems commands in response to the requirements stated by the Chief of Naval Operations. In addition, he is responsible for providing technical guidance (including development of maintenance requirements and standards) on a Navy-wide basis for the maintenance of equipments and weapons systems. DOD Directive 5030.9 of 19 January 1972, subject: Coordination of Shipbuilding, Conversion and Repair for the Department of Defense (promulgated by SECNAVINST 4700.6, same subject), assigns responsibilities, under the command of the Chief of Naval Operations and the Chief of Naval Material, to the Commander, Naval Ship Systems Command for the coordination of shipbuilding, conversion, and repair for the Department of Defense.

3. In order to carry out the foregoing responsibilities, the following functions concerning the maintenance of ships shall be performed as indicated:

a. By the Chief of Naval Operations:

(1) Coordinate the efforts of the Operating Forces of the Navy with those of the Naval Material Command in regard to the maintenance and improvement of ships.

(2) Establish the policy for regular overhauls and selected restricted availabilities of all ship types, including ships of the Naval Reserve Forces (NRF) and service craft.

(3) Establish the priority of work to be performed by Naval Shipyards and Supervisors of Shipbuilding, Conversion and Repair.

(4) Approve and establish priority of alterations affecting ship military characteristics and authorize accomplishment of the Fleet Modernization Program.

(5) Coordinate the continued development, refinement, operation and use of the Navy Maintenance and Material Management (3-M) System in the Operating Forces of the Navy through the use of OPNAV-INST 4790.4 (the 3-M Manual).

(6) Coordinate the continued development, refinement, operation and use of the Ship's Force Overhaul Management System (SFOMS).

(7) Schedule ships for regular overhaul, Naval Reserve Force (NRF) overhaul, selected restricted availability (SRF), post shakedown availability (PSA), inactivation availability and conversion in accordance with the provisions of enclosure (4) and Tabs A and B thereto.

b. By the Commander, Naval Ship Systems Command: (As designated by the Chief of Naval Material)

(1) Provide technical guidance for the maintenance of assigned equipments and ship systems (Including the development of maintenance requirements and standards).

(2) Establish operating policies and workload limitations at the various shipyards.

(3) Establish for each ship type/class, a planning naval shipyard with design services responsibilities to develop for ship alterations the Basic Alteration (first time) Class Drawings (BACD) in the overhaul advance planning phase, update the required Selected Record Data/Drawings (SRD) and maintain currency of SRD by incorporating changes caused during other types of availabilities. Ensure that designated planning naval shipyards maintain a file of drawings for each ship for which it is the planning yard.

(4) Prepare ship overhaul schedules for review by the fleet commanders in chief in conjunction with the CNO in accordance with the schedule in enclosure (4). Upon completion of coordination with the fleet commanders in chief, submit the ship overhaul schedule to the Chief of Naval Operations for approval and publication. Monitor the execution of approved ship overhaul schedules.

(5) Establish, in coordination with the fleet commanders in chief, availability dates for approved ship conversions, other than SSBN and AS(FBM), keeping the Chief of Naval Operations informed as changes occur.

(6) Furnish timely information on the prospective workloads of naval shipyards and SUPSHIPS to the respective fleet commanders in chief for their guidance, recommending changes to scheduled overhauls to balance workload and avoid excessive cost to the Navy.

(7) Allocate funds for ship alterations, including material and alteration software support, and for maintenance and operation of shore based ship repair facilities coming under the Commander, Naval Ship Systems Command cognizance.

(8) Initiate the technical improvements under NAVSHIPSYSCOM cognizance, assign TIP priorities, provide for coordination of other systems commands' technical improvements and merge all technical improvements into one TIP priority listing. Represent the Chief of Naval Material for the TIP at the semi-annual fleet modernization conferences.

(9) Provide priorities for the alterations in the technical improvement plan and ensure the technical feasibility of the ship alteration military and technical improvement plans.

(10) Prepare the Fleet Modernization Program in accordance with time schedule in OPNAV Instruction 4720.2D, subject: Fleet Modernization Program Planning Procedures.

(11) Promulgate the Ship's Force Overhaul Management System (SFOMS) for surface ships.

(12) Establish performance standards for the accomplishment of maintenance, modernization and all other shipwork scheduled for accomplishment by depot level maintenance activities.

(13) Plan for and accomplish overhauls and selected restricted availabilities as approved and scheduled. Utilize Planning and Engineering for Repairs and Alterations (PERA) capabilities as appropriate.

(14) Provide for maintenance and preservation of inactive ships, service and yard craft, including assignment of restricted and technical availabilities requiring industrial assistance.

(15) For each major home port area, prepare and promulgate upon approval by the Chief of Naval Operations, listings of geographic locations considered to be in home port areas.

(16) Perform budgeting support functions for the Chief of Naval Operations in accordance with enclosures (7) and (8).

(17) Coordinate complex ship overhauls in accordance with established procedures (enclosure (5)).

(18) Implement the ship 3-M PMS in accordance with OPNAV-INST 4790.4, subject: Ships' Maintenance and Material Management (3-M) Manual.

(19) Validate installed equipment in accordance with the Ships Equipment Configuration and Accounting System (SECAS).

c. By other Systems Commands: (As designated by the Chief of Naval Material).

(1) Allocate funds for repairs and alterations, including software requirements, coming under their cognizance.

(2) Implement the ships' 3-M PMS in accordance with OP-NAVINST 4790.4.

(3) Provide technical guidance for the maintenance of assigned equipments and ship systems including the development of maintenance requirements and standards).

d. By the Fleet Commanders in Chief:

(1) Implement the Ships' 3-M PMS in accordance with OPNAV-INST 4790.4. Ensure that each ship maintains an up-to-date Current Ships Maintenance Project (CSMP).

(2) Schedule adequate upkeep time, including periodic availabilities at an intermediate Level Maintenance Activity to permit accomplishment of preventive maintenance and repairs which cannot be accomplished at the organizational level. Maintain a full workload for all IMAs. Establish policies for reporting excessive deferred maintenance backlog for individual ships and assignment of more than "normal" upkeep time. Define "excess backlog of deferred maintenance" for each ship type or class with respect to the foregoing.

(3) Conduct material inspections as set forth in OPNAV Instruction 5040. 7, subject: Naval Command Inspection Program, as further defined in OPNAVINST 5040. 12A, subject: Naval Command Inspection Program for Forces Afloat, to determine the state of maintenance and material readiness of individual ships and take or recommend measures to correct deficiencies.

(4) Schedule INSURV inspections in accordance with OPNAV-INST 4730. 5H.

(5) Recommend specific ships for overhaul, post shakedown availabilities and scheduled restricted availabilities guided by the following:

(a) Review recommended ship regular overhaul and post-shakedown availability schedules submitted by the Commander, Naval Ship Systems Command.

(b) Assure adherence to prescribed overhaul cycles as practicable (enclosure (4)). All extensions of interval, whether for operational reasons or lack of resources, should be reported to the Chief of Naval Operations.

(c) Nominate ships for complex ship overhauls at least 18 months in advance to permit issuance of a 360 day letter and estimates of funding and man-day limits 240 days prior to the start of the overhaul (enclosure (5)).

(6) Assign all categories of ship availabilities as defined in enclosure (1) with the exception of overhauls post-shakedown availabilities and selected restricted availabilities.

(7) Budget for and administer funds allocated for maintenance and operation of the Fleet.

(8) Prior to the commencement of overhaul of a ship, determine what repairs and type commander directed alterations, including alteration software support, are necessary to assure reasonably reliable operation during the subsequent operational cycle. Report to the Chief of Naval Operations with copies to the Chief of Naval Material and the Commander, Naval Ship Systems Command, the circumstances surrounding the accomplishment of any overhaul considered to be less than required to assure reasonable reliability. This report should include a list of significant items and the estimated cost of each item.

(9) The use of one of the modes of SFOMS is encouraged to provide the intensive management required to achieve an optimum utilization of ship's force personnel by forecasting, scheduling, and controlling ship's force work during an industrial availability.

(10) Inform CNO and CHNAVPERS if the ship manning during overhaul is not maintained at a level consistent with the workload planned for ship's force accomplishment to achieve the objectives of paragraph 4b, enclosure (3).

(11) Conduct post-availability at-sea tests to determine that all systems/equipments installed/repaired during the availability are operational and meet safety standards.

(12) Perform the above functions for all ships assigned to the Naval Reserve Forces.

e. By Commander Military Sealift Command:

(1) Maintain military manned ships of the Military Sealift Command in a manner similar to that set forth above in paragraph 3d, as applicable, and in OPNAV Instruction 4700.9A, subject: Ships Assigned to MSTS: Responsibility for Technical and Material Matters.

f. By Board of Inspection and Survey:

(1) Conduct material inspections of designated ships as set forth in U.S. Navy Regulations and OPNAV Instruction 4730.5H, subject: Material Inspections of Ships Conducted by the Board of Inspection and Survey.

4. Implementation. (See Tab A for specific milestones for bidding private shipyard overhauls and major restricted availabilities).

a. Naval Ship Systems Command. (As directed by the Chief of Naval Material)

(1) The Naval Ship Systems Command shall maintain records of the ship repair workload for each naval shipyard, and for private ship repair contractors and shall recommend to the Chief of Naval Operations distribution of ship repair work between naval and private shipyards. Carry out the policy guidance provided in OPNAVINST 4860.5A, subject: Use of contractor and government resources for maintenance and material; procedures for, which implements DOD policy regarding depot level maintenance workload distribution between contractor and government resources, including the provision that generally no more than 70% of the productive man-hours associated with depot maintenance of mission essential material should be accomplished at organic depot maintenance facilities.

(2) The Naval Ship Systems Command shall issue letters authorizing shipalts in time to reach the cognizant Naval Shipyard Commander or Supervisor of Shipbuilding. Conversion and Repair and the Commanding Officer of the ship concerned at least 180 days prior to the start of overhaul for all non-complex ship overhauls and 360 days for all designated complex ship overhauls. Necessary action will be taken to ensure availability of plans, including advance planning for the development of BACD and material in sufficient time to permit the orderly accomplishment and timely completion of work. The availability status of alteration special program material and SRD will be included in the shipalt authorization leter and all changes thereto.

(3) Ensure that the funding and timing of alterations includes provisions for the design, engineering and technical services for developing alterations and the BACD together with the updating of SRD and Consolidated Shipboard Allowance Lists (COSALS) during the overhaul. Updated SRD and COSAL will be provided to operating forces no later than 60 days after end of overhaul.

(4) Ensure proper implementation of the PERA Program so that optimum improvement can be achieved in the maintenance and logistic aspects of fleet support. Proper interfaces shall be maintained between PERA and other on-going maintenance/logistics programs.

b. Forces Afloat

(1) When a ship has been assigned availability for regular overhaul, the commanding officer of the ship shall submit requests or automated work packages for the accomplishment of all repairs and authorized alterations which are beyond the capacity of the ship's force including, when appropriate, items recommended by a Board of Inspection and Survey incident to a material inspection of the ship. The relative urgency of work requested shall be indicated.

(2) Reports or recommendations by boards should not be considered as sufficient authority in themselves to guarantee the accomplishment of a subsequent work request.

(3) Should the commanding officer deem any item of repair or alteration recommended by a board to be unnecessary, he shall so report to the appropriate authorities.

(4) Advance copies of the ship's work request or automated work package shall reach the cognizant activities no less than the times indicated before commencement of ship overhauls as follows:

(a) 210 days before a nuclear submarine overhaul.

(b) 300 days before commencement of a designated complex ship overhaul.

(c) 150 days before commencement of a non-complex ship overhaul.

(5) Type commander action on work lists shall reach cognizant activities no later than the times indicated before commencement of ship overhauls as follows:

(a) 180 days before a nuclear submarine overhaul.

(b) 270 days before a designated complex ship overhaul.

(c) 120 days before a non-complex ship overhaul.

(6) Work requests will be written completely and concisely in order to minimize the need for further inspection by the performing activity. The results of ordnance and electronics prearrival inspections, as available, will be considered by the type commanders in taking action on ordnance and electronics work requests. Each work request for ship's systems or components (hull, mechanical, electrical, electronic or ordnance) will provide the suitable class of overhaul (A, B, C, D, or E) desired, based on the definitions provided in enclosure (1). The type commander will inform the activity as to the availability of the ship for inspection.

(7) Commanding officers shall make every effort to submit requests for all work required and which can be foreseen, before arrival at the repair activity. When at a repair activity the commanding officer of a ship shall submit direct to his type commander requests for all necessary repairs not previously requested with copy to the Commanding Officer of the repair activity and Fleet Commander. Supplemental work requests must be held to an absolute minimum and must meet one of the following criteria:

(a) Mandatory safety item.

(b) Mandatory to enable the ship to carry out its assigned mission.

(c) Will result in funds savings on previously authorized work without impacting on schedule.

(8) The Commanding Officer of the ship and his assistants shall confer frequently with appropriate officials of the repair activity as to the work being undertaken.

(9) The inspection of work being done by a repair activity for a ship shall be the responsibility of the commanding officers of both the repair activity and of the ship. The commanding officer of the repair activity shall require such inspections to be made as will ensure the proper execution of the work and adherence to prescribed specifications and methods. The commanding officer of a commissioned ship undergoing overhaul retains the responsibility for the safety of the ship and its crew. The commanding officer of the ship shall make such inspections as may be necessary to determine if the work is satisfactory, both during its progress and when completed, and to this end shall appoint such additional ship's inspectors as may be necessary to assist and represent him. For a ship not in commission the naval commander to whom the ship is assigned, or his designated representative, shall perform the inspections prescribed herein.

(10) Official correspondence with the Navy Department or with the commander of the fleet or unit of the fleet to which a ship at a naval shipyard is attached shall, unless otherwise specified, be forwarded via the commander of the shipyard when the subject of such correspondence pertains to the work or performance of the shipyard.

(11) When the commanding officer of a ship deems any item of work done for his ship by a repair activity to be unsatisfactory and satisfactory adjustment cannot be obtained locally, he shall report the facts to the type commander via the commanding officer of the repair activity, who shall submit by endorsement his recommendation in the matter to the authority to whom the report has been made. For a ship not in commission, reports of unsatisfactory work shall be made by the naval commander to whom the ship is assigned, or his designated representative.

c. Performing Activity

(1) Duties of the commanding officer of a shore based repair activity prescribed herein will, when appropriate, apply to a Supervisor of Shipbuilding, Conversion and Repair and to tiger team sponsors, i.e., SYSCOM managing tiger team.

(2) No work on a ship except that of an emergency nature shall be undertaken by a shore based repair activity unless availability at such an activity has been granted the ship.

(3) Insofar as practical, the commanding officer of the repair activity shall assemble in advance the plans and material required for work authorized for accomplishment on a ship scheduled for availability at the activity under his command. The receipt of approved work requests from the appropriate authority shall constitute assignment of technical

availability for advance procurement and/or manufacture of material and for preparing design support requirements.

(4) A pre-arrival conference will be held as early as possible for all availabilities in order to finalize all aspects of the work package. In the case of a regular overhaul and SRA's, the pre-arrival conference will be held not later than sixty days prior to the commencement of the availability. Insofar as practical, all the work for the availability will be authorized at the pre-arrival conference.

(5) The commanding officer of the repair activity shall review the lists of work received for each ship. If, in the opinion of that officer, any significant changes pertaining to the items listed are advisable, he shall make appropriate recommendation, including pertinent comments of the commanding officer of the ship to the grantor of the availability.

(6) If, during the repair activity's investigation of work requested, or if during the course of the work, conditions develop which render it inadvisable to do the work as determined by the authority providing the funds for the work, the commanding officer of the repair activity shall so inform the commanding officer of the ship and the authority providing the funds for the work. If the scope of the work is greater than determined by authority providing funds for the work, the commanding officer of the repair activity shall, if necessary, request additional funds from the providing authority. In addition, in the case of complex overhauls, if the man-day restraints will be in jeopardy NAVSHIPSYSCOM and the authority providing the funds must be informed before proceeding.

(7) Supervisors of Shipbuilding, Conversion and Repair in reviewing ship alterations and repairs shall order selected/controlling material subject to availability of funds provided, and provide to contractor as Government Furnished Material where insufficient time would remain after contract award for contractor to procure.

(8) Work shall be started on all approved and authorized repairs and alterations, including appropriate software requirements, in sufficient time to ensure that established or recommended completion dates will be met, providing that such work can be accomplished within the prescribed limit of funds provided and length of the availability assigned.

(9) When work cannot be accomplished within the funds provided or length of availability assigned (and man-day constraints for complex overhauls), the commanding officer of the repair activity shall promptly refer the matter to the authority providing the funds or the grantor of the availability as appropriate (and NAVSHIPSYSCOM in any case for complex overhauls) for decision, with copy to the commanding officer of the ship.

(10) The commanding officer of the repair activity shall, in a timely manner, keep the commanding officer of the ship appropriately informed of the repair activity's action on all items of work and the costs thereof when determined, and of the issue, closing, cancellation, or other changes in the status of job orders affecting the ship.

(11) The commanding officer of the repair activity shall, so far as practicable, make available to the ship facilities for repairs and authorized alterations undertaken by the ship's force.

(12) If no definite date has been established for the completion of work on the ship, the commanding officer of the repair activity shall recommend a completion date to the grantor of the availability, and shall inform the commanding officer of the ship of such recommendation.

(13) The commanding officer of a repair activity shall, upon completion of the overhaul, fitting out, or conversion of a ship, submit to the authorities concerned (TYCOM ISIC, etc.) a report showing the status of completion of each item of repair or alteration, including certification or status of delivery of SRD and drawings thereto, and listing those items authorized but not undertaken.

(a) Except in unusual circumstances, job orders for uncompleted repair work shall be closed or cancelled on the final departure of a ship from a repair activity. The commanding officer of the ship and the appropriate type commander shall be informed of this action together with the reasons therefor.

(b) Should work be desired later on job orders that have been closed or cancelled, new requests shall be made by the commanding officer of the ship concerned.

(c) In case of the departure of a ship from a repair activity, where unfinished work is to be completed at another activity, all outstanding job orders shall be transferred to the latter together with all pertinent information and such material as had been assembled for the work.

(14) In the case of private shipyard overhauls the Supervisor of Shipbuilding, Conversion and Repair will inform the ship, with information copy to the Naval Ship Systems Command and type commander, of the location of the overhaul as early as possible but not later than two weeks before commencement of overhaul. General information is desired at the earliest possible date with more specific information as to the exact location of the overhauling activity as soon as the contract is awarded. The Supervisor of Shipbuilding, Conversion and Repair, or the Naval Shipyard Commander in the case of naval shipyard overhauls, shall make inspection arrangements with the type commander.

(16) Supervisor of Shipbuilding, Conversion and Repair shall provide the ship with a letter prior to the last month of the repair availability outlining software to be provided by the contractor and status. A follow up report at the completion of the repair availability shall be provided (copies to Naval Ship Systems Command (Ship Logistic Managers) and the appropriate type commander).

APPENDIX-C

CURRENT SHIPS MAINTENANCE PROJECT

(CSMP)

General Description

The Current Ships Maintenance Project (CSMP) is a consolidated listing of a ship's deferred maintenance actions. It is the basic maintenance management tool used on board ship. It is also the most important ship originated document for use in pre-overhaul repair planning. The CSMP is a basic element of the Maintenance Data Collection Sub-system (MDCS) of the Ship's Maintenance and Material Management (3-M) System. The complete CSMP is made up of:

1. Computer-produced standard CSMP reports listing deferred repairs and alterations which have been identified through MDCS reporting.

2. Ship-retained copies of MDCS documents (OPNAV 4790/2K) which have been submitted but are not yet reflected in CSMP reports.

3. Lists of discrepancies (Ship's Force Work List) to be corrected by ship's force which meet any of the following criteria:

   a. Will be corrected within 30 days.

   b. Do not require assistance from a source external to the ship.

   c. Do not describe maintenance-reflected deficiencies reported by INSURV.

Purpose

The purpose of the CSMP is to provide a comprehensive description of all corrective maintenance actions outstanding in a ship to:

1. The shipboard maintenance managers to provide them with the tools necessary to the management and control of their ship's maintenance.

2. Managers in other operational and support commands and activities for financial, industrial, and operational planning and analytical purposes.

The CSMP can be used by:

1. The ship to

    a. Determine

        (1) The effects of deferred maintenance in limiting the ship's capabilities and identifying potential CASREPT situations.

        (2) Weaknesses or shortages in skill levels and/or resources aboard ship required to do the deferred maintenance.

        (3) The kind and amount of outside assistance needed to complete deferred maintenance.

        (4) The amount of upkeep/cold iron time needed by the ship.

        (5) Plans of action for accomplishing the deferred maintenance.

        (6) The material condition of each individual work center.

    b. Evaluate the management performance of work center supervisors.

2. Intermediate Unit Commanders to review and provide direction and recommendations concerning a ship's maintenance problems in relation to upkeep time, tender availabilities, etc.

3. Type Commanders to determine force-wide maintenance problems and trends in order to develop future maintenance budgets and scheduling of availabilities.

4. PERAs/SUPSHIPS/Shipyards to plan for repair action in support of individual ships.

5. System Commands to determine fleet-wide maintenance problems and trends in order to initiate such corrective actions as redesign, substitutions, increased support, etc.

Responsibilities

The CSMP is to be physically located in the work center and the work center supervisor is responsible for ensuring that it accurately describes the material condition of his work center. The ship's force worklist is to be kept current and reviewed at least weekly by the division officer.

The maintenance man shall identify and report through the MDCS, on OPNAV 4790/2K, SHIP'S MAINTENANCE ACTION FORM (2-KILO), the deferral of that maintenance which:

1. Requires some type of assistance from an activity outside of the ship.

2. Is not expected to be completed by ship's force within 30 days.

3. Describes maintenance-related deficiencies reported by INSURV.

Documentation and reporting procedures are detailed in OPNAVINST 4790.4, Ships' Maintenance and Material Management (3-M) Manual, Volume II.

During an availability, prompt documentation and submission of deferred maintenance actions as they are completed is desirable to preclude the necessity of processing a large number of documents at the conclusion of the availability.

Examples

A recommended format for the ship's force worklist and examples of the computer-printed CSMP reports are contained in OPNAVINST 4790.4 Ch.-1, Ships' Maintenance and Material Management (3-M) Manual, dated 9 April 1974, Volume II. Detailed instructions regarding the completion of the Ship's Maintenance Action Form (2-KILO) are also contained in this instruction. However, because the CSMP is basically a compilation of all 2-KILO's submitted by the ship, and it is common to find the CSMP to be of little use as a result of poorly written 2-KILOS's, it is considered desirable to include additional information concerning their preparation in this notebook.

The remaining pages of this Appendix, C-5 to C-29, are devoted to several case problems illustrating poor, fair and good data being provided in sections IV and V of the Ship's Maintenance Action Forms (2-KILO's) along with a critical analysis of each form. Personnel responsible for completing these forms should realize the importance of including all pertinent information in these sections. They should attempt to place themselves in the position of a person unfamiliar with their system and its idiosyncracies and attempt to analyze and plan the required repair work on the basis of the information they are provided in the 2-KILO. It is not sufficient to simply state that a problem exists and must be corrected or that a particular piece of equipment requires overhaul. It is necessary to state the problem, the cause of the problem, any history that could prove useful to a repair agency and the probable solution to the problem. Any associated work such as interferences, accesses, etc., must also be mentioned and applicable drawings, technical manuals, or other pertinent reference material should be listed.

If good, comprehensive 2-KILO's are generated and a well organized CSMP is maintained, the result will be a valuable planning tool for the ship and any other of the commands or activities responsible for overhaul planning.

HISTORY

NO. 1 MAIN ENGINE

THE NO. 1 MAIN ENGINE HAS BEEN OBSERVED WITH FOUNDATION BOLTS COMING LOOSE. EACH TIME BOLTS ARE LOOSE, ENGINE VIBRATES EXCESSIVELY CAUSING UNDUE STRAIN ON THE BLOCK AND CRANKSHAFT. DURING ROUTINE WATCH STANDING INSPECTION, WATER WAS OBSERVED BLOWING FROM THE AIR BOX DRAINS. UPON FURTHER INVESTIGATION OF THE AIR BOX, A CRACK WAS DISCOVERED IN THE BLOCK BETWEEN NO. 1 AND NO. 2 CYLINDERS. COLD WELD WAS APPLIED BUT FAILED TO HOLD. EXPERTISE ABOARD SHIP IS INADEQUATE TO ACCOMPLISH REPAIR. NO FACILITIES ABOARD FOR MAGNAFLUX CHECK.

POOR

SECTION IV. REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION

BLOCK IS CRACKED XXX REPAIR CR
ACKED BLOCK OUTSIDE ASSISTANCE
REQUIRED

36. CONT SHEET

37. CSMP SUMMARY

38. FIRST CONTACT/MAINT. MAN (Print)	39. RATE	40. SECOND CONTACT/SUPERVISOR (Print)	41. PRI	42. T/A	43. INTEGRATED PRIORITY
J.G. DOE		E.T. LIST			

SCREENING

C. DIV. INIT.	D. DEPT. INIT.	E. COMMANDING OFFICER'S SIGNATURE	F. TYCOM AUTHORIZATION	44. IUC	45. TYCOM

46. SPECIAL PURPOSE	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.

SECTION V SUPPLEMENTARY INFORMATION

47. BLUEPRINTS, TECH. MANUALS, PLANS, ETC.	AVAILABLE ON BOARD YES	NO	48. PREARRIVAL ARRIVAL CONFERENCE ACTION/REMARKS

EXPLANATION

THIS WORK REQUEST DOES NOT TELL THE REPAIR ACTIVITY ANYTHING AT ALL ABOUT THE CRACK, SUCH AS, LENGTH, LOCATION, REPAIRS ATTEMPTED, DAMAGE IT'S CAUSING ENGINE, OR REPAIRS NECESSARY. THE MODEL NUMBER OF THE ENGINE AND TECHNICAL MANUAL ARE NOT INDICATED.

FAIR

SECTION IV. REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION
ENGINE CYL BLOCK IS CRACKED CA
USING WATER TO ENTER AIR BOX X
XX REQUEST SRF DISASSEMBLE ENG
INE ARC WELD BLOCK REASSEMBLE
ENGINE AND TEST FOR PROPER OPE
RATION
36. CONT SHEET
37. CSMP SUMMARY

38. FIRST CONTACT/MAINT MAN (Print)	39. RATE	40. SECOND CONTACT/SUPERVISOR (Print)	41 PRI	42 T/A	43. INTEGRATED PRIORITY
J.G. DOE		E.T. LIST			

C. DIV. INIT.	D. DEPT. INIT.	E. COMMANDING OFFICER'S SIGNATURE	F. TYCOM AUTHORIZATION	SCREENING 44. IUC	45. TYCOM

46. SPECIAL PURPOSE	A.	B.	C	D	E	F	G	H	I	J	K	L

SECTION V. SUPPLEMENTARY INFORMATION

47. BLUEPRINTS, TECH. MANUALS, PLANS, ETC	AVAILABLE ON BOARD YES	NO	48. PREARRIVAL/ARRIVAL CONFERENCE ACTION/REMARKS
ENG MODEL GM-8			
-278A			
NS 041-2304	X		

EXPLANATION

THIS WORK REQUEST DOES HAVE MORE INFORMATION BUT STILL LACKS INFO THE REPAIR ACTIVITY REQUIRES, SUCH AS LENGTH, LOCATION, REPAIRS ATTEMPTED, AND COMPLETE REPAIRS NECESSARY. NOTE THAT THE MODEL OF THE ENGINE AND THE TECHNICAL MANUAL HAVE BEEN INCLUDED.

BETTER

SECTION IV. REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION

ENGINE VIBRATES EXCESSIVELY CY
L BLOCK CRACKED APPROX 3 IN BE
TWEEN NO1 AND NO2 CYL CAUSING
FW TO ENTER AIR BOX COLD WELD
APPLIED FAILED TO HOLD XXX REQ
UEST SRF DISASSEMBLE ENGINE AR
C WELD MAGNETIC FLUX REASSEMBL
E AND TEST FOR PROPER OPERATIO
N

36. CONT. SHEET

37. CSMP SUMMARY

38. FIRST CONTACT/MAINT. MAN (Print)	39. DATE	40. SECOND CONTACT/SUPERVISOR (Print)	41. PRI	42. STA	43. INTEGRATED PRIORITY
J.G. DOE		E.T. LIST			

SCREENING

C. DIV. INIT.	D. DEPT. INIT.	E. COMMANDING OFFICER'S SIGNATURE	F. TYCOM AUTHORIZATION	44. IUC	45. TYCOM

46. SPECIAL PURPOSE

SECTION V SUPPLEMENTARY INFORMATION

47. BLUEPRINTS, TECH MANUALS, PLANS, ETC.	AVAILABLE ON BOARD YES	NO	48. PREARRIVAL/ARRIVAL CONFERENCE ACTION/REMARKS
ENG MODEL GM-8			
-278A			
NS 041-2304			

EXPLANATION

THIS WORK REQUEST TELLS THE REPAIR ACTIVITY WHAT THEY NEED TO KNOW FOR PLANNING PURPOSES.

HISTORY

NO. 1 FIRE AND FLUSHING PUMP MOTOR

THE NO. 1 FIRE AND FLUSHING PUMP MOTOR HAS A MAXIMUM LIFE OF THREE MONTHS WITHOUT MAINTENANCE.

QUARTERLY THIS HORIZONTAL MOUNTED CLOSE-COUPLED PUMP MUST BE DISASSEMBLED. DUE TO LOCATION IN AREA OF STEAM DRAINS, THIS MOTOR HAS A HISTORY OF DOWN TIME.

MOISTURE ENVIRONMENT WITH COMBINATION OF SLINGER RING AND PACKING PROBLEMS GROUNDS OUT THIS MOTOR OFTEN. AT LEAST 72 HOURS OF DOWN TIME IS REQUIRED TO WASH AND DRY OUT THE WINDINGS EVERY THREE MONTHS. BETWEEN OVERHAUL CYCLES, THE WINDINGS BURN OUT FIVE TO EIGHT TIMES.

POOR

SECTION IV. REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION

REWIND DIP AND INSULATE FIRE AND FLUSHING MOTOR AGAINST MOISTURE REPLACE BEARINGS

36. CONT. SHEET

37. CSMP SUMMARY

38. FIRST CONTACT/MAINT. MAN (Print)	39. RATE	40. SECOND CONTACT/SUPERVISOR (Print)	41. PRI	42. T/A	43. INTEGRATED PRIORITY
JOHN WALKER		J.C. LONGHORN			

SCREENING

C. DIV. INIT.	D. DEPT. INIT.	E. COMMANDING OFFICER'S SIGNATURE	F. TYCOM AUTHORIZATION	44. IUC	45. TYCOM

46. SPECIAL PURPOSE	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.

SECTION V. SUPPLEMENTARY INFORMATION

47. BLUEPRINTS, TECH. MANUALS, PLANS, ETC.	AVAILABLE ON BOARD YES	NO	48. PREARRIVAL/ARRIVAL CONFERENCE ACTION/REMARKS

EXPLANATION

THIS WORK REQUEST DOES NOT TELL THE REPAIR ACTIVITY WHAT IS WRONG, DEPTH OF THE PROBLEM, HISTORY, VOLTAGE, PART IDENTIFICATION, PLAN NUMBERS, TECH MANUAL ETC.

FAIR

SECTION IV. REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION

FIRE AND FLUSHING PUMP MOTOR B
URNED OUT DUE TO MOISTURE ENVI
RONMENTAL CONDITION XXX REWIND
ENCAPSULATE AND RENEW SEALED B
EARINGS ON 25HP 3PH 440VAC MOT
OR BENCH TEST FOR S/F ACCEPTAN
CE

36. CONT. SHEET

37. CSMP SUMMARY

38. FIRST CONTACT/MAINT. MAN (Print)	39. RATE	40. SECOND CONTACT/SUPERVISOR (Print)	41. PRI	42. T/A	43. INTEGRATED PRIORITY
J. WALKER		J.C. LONGHORN			

SCREENING

C. DIV. INIT.	D. DEPT. INIT.	E. COMMANDING OFFICER'S SIGNATURE	F. TYCOM AUTHORIZATION	44. IUC	45. TYCOM

46. SPECIAL PURPOSE	A	B	C	D	E	F	G	H	I	J	K	L

SECTION V SUPPLEMENTARY INFORMATION

47. BLUEPRINTS, TECH MANUALS, PLANS, ETC.	AVAILABLE ON BOARD YES	NO	48. PREARRIVAL/ARRIVAL CONFERENCE ACTION/REMARKS
NAVSHIPS 472-0			
520	X		

EXPLANATION

THIS WORK REQUEST HAS MORE INFO, BUT CONTAINS ALL GENERAL INFORMATION. THE TECH MANUAL IS LISTED, BUT OTHER DOCUMENTATION WOULD TELL A BETTER STORY.

BETTER

SECTION IV. REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION

FIRE AND FLUSHING PUMP MOTOR I
S DISASSEMBLED QTRLY DUE TO WI
NDING LOW RESISTANCE READING X
XX REWIND (WI AWG 9) ENCAPSULA
TE REPLACE SEALED BEARINGS (FI
IN 559-6252 558-5260) BENCH TE
ST FOR S/F ACCEPTANCE MFR GENE
RAL ELECTRIC FR562U 25HP 3PH 4
40VAC

38. FIRST CONTACT/MAINT. MAN (Print)	39. RATE	40. SECOND CONTACT/SUPERVISOR (Print)	41. PRI	42. S/A	43. INTEGRATED PRIORITY
J. WALKER		J.C. LONGHORN			

SECTION V. SUPPLEMENTARY INFORMATION

BLUEPRINTS, TECH MANUALS, PLANS, ETC	AVAILABLE ON BOARD YES	NO
ENCAP PROC: NS		
NOTE 9630 3/16		
/70	X	
NS 472-0520	X	

OPNAV 4790/2L

SUPPLEMENTAL FORM (2 LIMA)

SECTION I IDENTIFICATION

SHIP'S NAME — HULL NUMBER — JOB CONTROL NUMBER: SHIP'S UIC, WORK CENTER, JOB SEQ NO

CONTINUATION FOR ☐ 2K ☐ 2L ☐ 2P

SECTION II REMARKS/SKETCHES

BUSHIPS PLAN A057-502-252301
MOTOR IS LOCATED IN AREA OF STEAM DRAINS,
DUE TO HIGH MOISTURE EXPOSURE MOTOR
WINDINGS SHORTED OR BURNED OUT FIVE TO
EIGHT TIMES BETWEEN OVERHAUL CYCLE.

EXPLANATION

THIS WORK REQUEST GOES A LONG WAY TOWARD INFORMING THE REPAIR ACTIVITY OF THE NATURE OF THE PROBLEM, THE PROBLEM SOLUTION AND THE REQUIRED DATA NECESSARY TO PERFORM THE WORK. NOTE THE USE OF THE 2L TO FURTHER DETAIL THE PROBLEM.

HISTORY

AN/SPS-10B

TROUBLE NOTED IS THAT PERFORMANCE IS UNRELIABLE DUE TO UNSTABLE OPERATION.

THE PRIMARY CAUSE OF THE TROUBLE IS THAT 90% OF ALL WIRING INSULATION IS BRITTLE AND CRACKED.

A SECONDARY CAUSE IS THAT THE EQUIPMENT IS LOCATED IN A SPACE SUBJECT TO EXCESSIVE HEAT.

FIRST INDICATION OF TROUBLE WAS LOSS OF VIDEO ON AN/SPA-4B. (MASTER RADAR REPEATER FOR AN/SPS-10B.)

AMPLIFYING INFORMATION WHICH CAN BE NOTED IS THE AN/SPS-10B COMPONENTS MUST BE REMOVED FROM EXISTING SPACE AS THERE IS NO WORKING ROOM TO ACCOMPLISH REWIRING TASK.

POOR

SECTION IV. REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION

EQUIPMENT INOPERATIVE XXX TROU
BLE SHOOT AND REPAIR AS NECESS
ARY

36. CONT. SHEET

37. CSMP SUMMARY

38. FIRST CONTACT/MAINT. MAN (Print)	39. RATE	40. SECOND CONTACT/SUPERVISOR (Print)	41. PRI	42. T/A	43. INTEGRATED PRIORITY
A.W. PAULSON		R.L. SIMMONS			

SCREENING

C. DIV. INIT.	D. DEPT. INIT.	E. COMMANDING OFFICER'S SIGNATURE	F. TYCOM AUTHORIZATION	44. IUC	45. TYCOM

46. SPECIAL PURPOSE

SECTION V. SUPPLEMENTARY INFORMATION

47. BLUEPRINTS, TECH. MANUALS, PLANS, ETC	AVAILABLE ON BOARD YES	NO	48. PREARRIVAL/ARRIVAL CONFERENCE ACTION REMARKS
TECH MAN-NAVSH			
IPS 0967-15670	X		

EXPLANATION

THIS WORK REQUEST DOES NOT TELL THE REPAIR ACTIVITY WHAT IS WRONG, WHAT IS TO BE DONE, PROBABLE CAUSE, ASSOCIATED WORK. EVEN THOUGH THE TECHNICAL MANUAL IS INDICATED IT CAN'T BE USED.

FAIR

SECTION IV. REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION

EQUIPMENT IS UNSTABLE XXX PERF
ORM CLASS B OVERHAUL AND PERFO
RM SYSTEMS CHECK

36. CONT. SHEET

37. CSMP SUMMARY

38. FIRST CONTACT/MAINT MAN (Print)	39. RATE	40. SECOND CONTACT/SUPERVISOR (Print)	41. PRI	42. T/A	43. INTEGRATED PRIORITY
A.W. PAULSON		R.L. SIMMONS			

C. DIV. INIT.	D. DEPT. INIT.	E. COMMANDING OFFICER'S SIGNATURE	F. TYCOM AUTHORIZATION	SCREENING 44. IUC	45. TYCOM

46. SPECIAL PURPOSE	A.	B	C.	D	E	F	G	H	I.	J.	K.	L.

SECTION V. SUPPLEMENTARY INFORMATION

47. BLUEPRINTS, TECH MANUALS, PLANS, ETC.	AVAILABLE ON BOARD YES	NO	48. PREARRIVAL/ARRIVAL CONFERENCE ACTION/REMARKS
BUSHIPS DWG AO			
57-56202-50553	X		
TECH MAN-NAVSH			
IPS 0967-15670	X		

EXPLANATION

THIS WORK REQUEST DOES NOT TELL THE REPAIR ACTIVITY WHAT IS WRONG, PROBABLE CAUSE, AND ASSOCIATED WORK. IN SPECIFYING WHAT IS TO BE DONE THE WORK REQUEST PROVIDED A GENERALIZATION OF THE WORK REQUIRED.

BETTER

SECTION IV. REMARKS/DESCRIPTION

35 REMARKS/DESCRIPTION

LOSS OF VIDEO TO AN/SPA-4B AND
OVERALL UNSTABLE OPERATION DUE
TO CRACKED AND BRITTLE INTERNA
L WIRING XXX REMOVE EQUIPMENT
FROM SHIP REPLACE WIRING REINS
TALL AND PERFORM SYSTEM CHECKO
UT AN/SPS-10 ROOM IS TOO SMALL
TO PERMIT REWIRING IN PRESENT
LOCATION

37. COMP SUMMARY

38 FIRST CONTACT MAINT MAN (Print)	39 RATE	40 SECOND CONTACT SUPERVISOR (Print)	41	42	43 INTEGRATED PRIORITY
A.W. PAULSON		R.L. SIMMONS			

SCREENING

TYCOM AUTHORIZATION

SECTION V. SUPPLEMENTARY INFORMATION

	AVAILABLE ON BOARD YES	NO	PREARRIVAL ... REMARKS
BUSHIPS DWG AO			
57-56202-50553	X		
TECH MAN-NAVSH			
IPS 0967-15670	X		

OPNAV 4790/2L

SUPPLEMENTAL FORM (2-LIMA)

SECTION I IDENTIFICATION

A SHIP'S NAME

B HULL NUMBER

JOB CONTROL NUMBER

C SHIP'S UIC | D WORK CENTER | E JCN SEQ NO

CONTINUATION FOR 2K 2L 2P

SECTION II REMARKS/SKETCHES

PROBABLE REASON FOR DEFECTIVE WIRING IS
EXCESSIVE HEAT IN AN/SPS-10 B ROOM.
INVESTIGATION REQUIRED TO DETERMINE CAUSE
OF EXCESSIVE HEAT.

EXPLANATION

THIS WORK REQUEST TELLS THE REPAIR ACTIVITY WHAT THEY NEED TO KNOW FOR PLANNING PURPOSES. NOTE THAT FURTHER EXPLANATION OF THE PROBLEM IS INDICATED ON THE 2L FORM.

HISTORY

SHELVES IN CREW'S GALLEY

THE STAINLESS STEEL SHELVES PRESENTLY LOCATED IN THE CREW'S GALLEY ARE INADEQUATE. CERTAIN ITEMS CANNOT BE STORED ON THE SHELVES DUE TO CLOSE SPACING BETWEEN SHELVES. ADDING COMPARTMENTS TO THE SHELVES WOULD PROVIDE BETTER STOWAGE FOR SMALLER UTENSILS.

INSTALLATION OF THE NEW SHELVES IN A DIFFERENT LOCATION TO BEST SUIT THE CONDITIONS IN THE GALLEY WOULD REQUIRE RELOCATION OF A NEARBY WORK TABLE.

POOR

SECTION IV. REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION

MANUFACTURE STAINLESS STEEL SH
ELVES FOR GALLEY XXX SEE ATTAC
HED DRAWING FOR DETAILS

37. CAP SUMMARY

38. FIRST CONTACT MAINT. MAN (Print)	39. RATE	40. SECOND CONTACT SUPERVISOR (Print)	41. PRI	42.	43. INTEGRATED PRIORITY
P.T. BARN		S.A. BAIL			

OPNAV 4790/2L

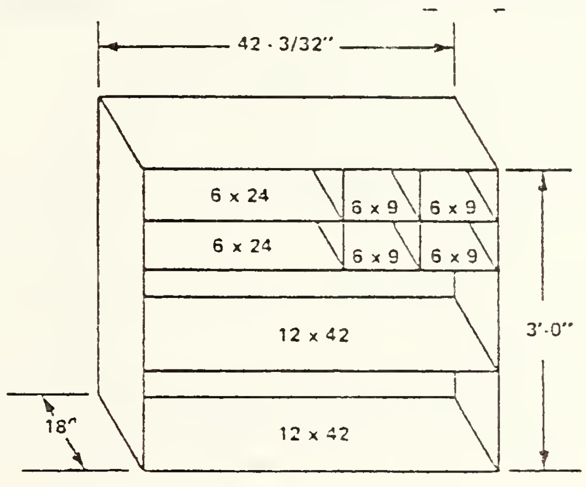
SUPPLEMENTAL FORM (2 LIMA)

SECTION I IDENTIFICATION

A. SHIP'S NAME | B. HULL NUMBER | JOB CONTROL NUMBER: C. SHIP'S UIC | D. WORK CENTER | E. JOB SEQ NO

F. CONTINUATION FOR 2K 2L 2P

SECTION II REMARKS/SKETCHES



EXPLANATION

THIS WORK REQUEST DOES NOT INDICATE THE FULL SCOPE OF WORK REQUIRED. ALTHOUGH A SKETCH HAS BEEN INCLUDED, IT IS CLUTTERED WITH TOO MUCH INFORMATION. THE REQUIREMENT OF A 42 3/32" DIMENSION IS TOO STRINGENT.

FAIR

SECTION IV. REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION

MANUFACTURE STAINLESS STEEL SH
ELVES FOR CREWS GALLEY XXX REM
OVE EXISTING SHELVES SEE ATTAC
HED DRAWING FOR DETAILS

36. CONT. SHEET

37. CSMP SUMMARY

38. FIRST CONTACT/MAINT. MAN (Print)	39. RATE	40. SECOND CONTACT/SUPERVISOR (Print)	41. PRI	42. T-4	43. INTEGRATED PRIORITY
P. T. BARN		S. A. BAIL			

SCREENING

DIV. INIT.	D. DEPT. INIT.	E. COMMANDING OFFICER'S SIGNATURE	F. TYCOM AUTHORIZATION	44. IUC	45. TYCOM

46. SPECIAL PURPOSE	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.

OPNAV 4790/2L

SUPPLEMENTAL FORM (2 LIMA)

SECTION I IDENTIFICATION

A. SHIP'S NAME

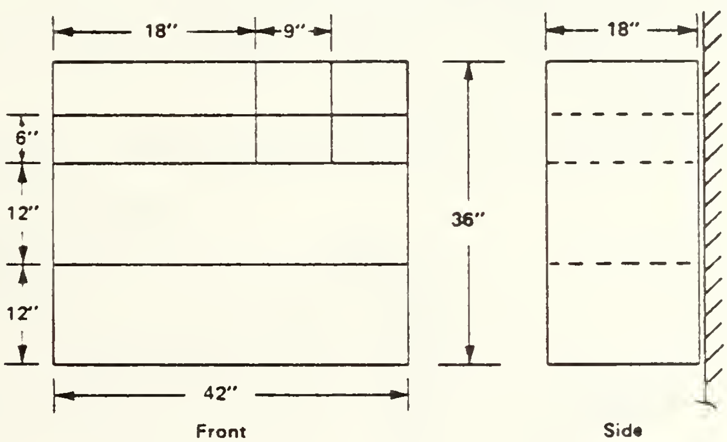
B. HULL NUMBER

JOB CONTROL NUMBER

C. SHIP'S UIC	D. WORK CENTER	E. JOB SEQ. NO.

CONTINUATION FOR ☐ 2K ☐ 2L ☐ 2P

SECTION II REMARKS/SKETCHES



EXPLANATION

THIS WORK REQUEST DOES INDICATE ASSOCIATED WORK, BUT NOT ALL THE DESIRED WORK. THE SKETCH INDICATES ALL THAT IS REQUIRED FOR PLANNING THE MANUFACTURE AND INSTALLATION OF THE SHELVES.

BETTER

SECTION IV REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION

MANUFACTURE STAINLESS STEEL SH
ELVES FOR CREWS GALLEY XXX REM
OVE EXISTING SHELVES LOCATED A
DJACENT TO STEAM KETTLES STBD
SIDE RELOCATE WORK TABLE TO PO
RT SIDE OF NEW SHELVES NEAR OV
EN SEE ATTACHED DRAWING FOR DE
TAILS FOR MANUFACTURING NEW SH
ELVES

36. CONT. SHEET

37. COMP SUMMARY

38. FIRST CONTACT MAINT. MAN (Print)	39. RATE	40. SECOND CONTACT/SUPERVISOR (Print)	41. PRI	42.	43. INTEGRATED PRIORITY
P.T. BARN		S.A. BAIL			

SCREENING

44. IUC

45. TYCOM

SECTION V SUPPLEMENTAL INFORMATION

47. BLUEPRINTS, TECH. MAN ACL, PLANS, ETC.	AVAILABLE ON BOARD YES	NO	48. PREARRIVAL/ARRIVAL CONFERENCE ACTION/REMARKS
A5R-8-345-5017			
32	X		

OPNAV 4790/2L

SUPPLEMENTAL FORM (2 LIMA)

SECTION I IDENTIFICATION

A. SHIP'S NAME

B. HULL NUMBER

JOB CONTROL NUMBER

C. SHIP'S UIC

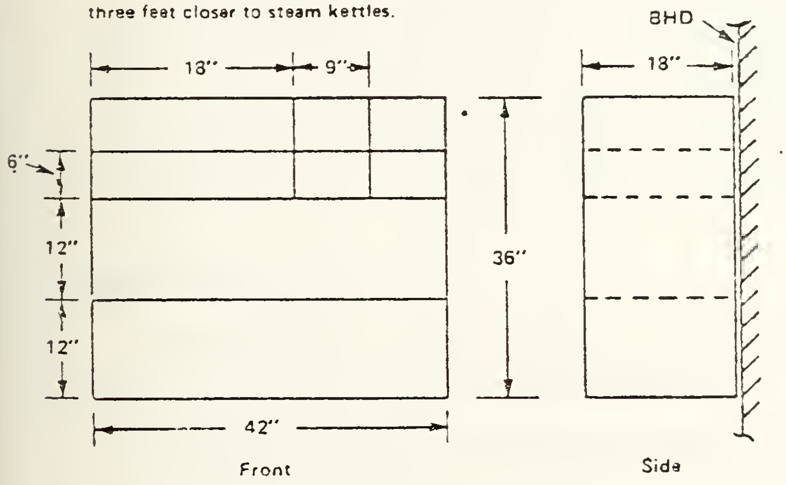
D. WORK CENTER

E. JOB SEQ NO

CONTINUATION FOR 2K 2L 2M

SECTION II REMARKS/SKETCHES

This will enable installation of new shelves three feet closer to steam kettles.



EXPLANATION

THIS WORK REQUEST INDICATES ALL WORK DESIRED AND INCLUDES THE SKETCH. NOTE THAT A SHIP'S PLAN HAS BEEN INDICATED TO SHOW THE PRESENT ARRANGEMENT OF THE CREW'S GALLEY.

APPENDIX -D

PRE-OVERHAUL TEST AND INSPECTION PROGRAM

(POT & I)

General Description

The POT & I Program is divided into three major phases, POT & I Planning, POT & I Execution, and Preparation of the POT & I Report.

POT & I Plans are developed on a ship class basis. That is, a plan is developed for the class based on the first ship of the class to be overhauled using this program. The plan is then updated for each follow-on ship to be overhauled. POT & I Plans are designed to be interchangeable between shipyards with minimal adjustments for a particular hull. A plan is constructed from individual pages which contain the necessary information to conduct a specific test and/or inspection and the assignment of the accomplishing activity - forces afloat or shipyard. These individual pages, called Repair Inspection Record (RIR) pages (see Figure D-1) also include space to record the results of the test/inspection and recommendations as to the actions necessary to correct any deficiencies or discrepancies that are found.

POT & I Execution involves a thorough pre-overhaul inspection by the designated accomplishing activities which gives a comprehensive assessment of the ship's material condition.

Purpose

The POT & I Program provides a means of identifying deficiencies in ship's systems or equipment. The plan shall be developed to identify all tests and inspections, which when executed and documented, provide input to a comprehensive repair work package for ready incorporation into the Ship's Alteration and Repair Package (SARP). Since the SARP, if satisfactorily completed, should ensure safe and reliable operation of the ship during the post-overhaul operating cycle, the necessity for and importance of a thorough, vigorously executed POT & I is obvious.

Responsibilities

PERA(CRUDES) is responsible for the development of an approved plan for Pre-Overhaul Test and Inspection.

The POT & I Plan is executed by both Ship's Force and, normally, the overhauling shipyard, although repair activities other than the

REPAIR INSPECTION RECORD

1. SHIP & HULL NO.			
2. NAME OF EQUIPMENT	3. SYSTEM	4. ESS. NO.	5. ITEM NO.
6. LOCATION	7. APL/CID		

8. ACTIVITY	9. CODE/NO. MEN	10. CODE/NO. MEN	11. CODE/NO. MEN	12. DURATION (A) TEST (B) INSP	13. DRYDOCK / PIER / SEA

14. S.F. ASSISTANCE AND PREPARATION REQUIRED	S.F. CONTACT
	W.C.
	MIP NO.

15. INSPECTION/TEST DESCRIPTION AND REFERENCES	TECH. MAN. NO.	TEST PROCEDURE NO.	PLAN NO.

16. CONDITION/TEST RESULTS CODE 190/240/225	17. INSP NAME	19. CODE	20. DATE

21. RECOMMENDATIONS (SY FA)

22. JOB TITLE	23. FCN	24. JCN	25. EIC

SHOP	11	17	24	26	31	38	38	41	51	56	64	67	71	72	99				

27. PLANNER I.D.		SALES ESTIMATE				
28. M/H	29. MAT'L	30. M/H	31. LABOR	32. OV'HD	33. MAT'L	34. TOTAL
						35. PG. NO.

FIGURE D-1 REPAIR INSPECTION RECORD (RIR) PAGE

overhauling shipyard can be used. The tests and inspections designated for accomplishment by the Ship's Force should be completed prior to the shipyard POT & I availability to allow for shipyard review of the results and clarification, if necessary. The Ship's Force should also submit copies of the results of inspections by outside activities such as INSURV, NOSSO, PEB. etc., with corresponding OPNAV 4790/2K Forms to further elaborate on material conditions. These reports of inspections should be submitted as supplemental to the inspection requirements of the POT & I Repair Inspection Record pages, except that data from inspections conducted within four months of the POT & I may be used to complete the applicable portions of the RIR. (Table D-1, included for information purposes, contains instructions for preparation of RIRs, Figure D-1.)

Upon completion of the POT & I, the overhauling shipyard consolidates the Ship's Force and shipyard inspection recommendations of the POT & I by ship's system, designates recommended accomplishing activity, and estimates cost into a proposed SARP.

Example

The POT & I Plan shall consist of a Binder/Cover, Title Sheet, Introduction, Table of Contents, POT & I Index, Repair Inspection Record Sheets, Index Tabs and Test/Inspection Procedures. A sample (skeletal) Plan is included in this Appendix.

TABLE D-1 REPAIR INSPECTION RECORD (RIR) INSTRUCTIONS

The POT & I Plan divides the ship into systems for which Repair Inspection Records (RIR) are prepared corresponding to the system/equipment identification in the Index. Additional RIR sheets may be added where several similar systems/equipments are on the ship (e.g. Boiler 1A, Boiler 1B, Guided Missile Fire Control System 2, Guided Missile Fire Control System 5, etc.).

The RIR shall document all test/inspection, maintenance and material historical data which is necessary to provide a basis for making recommendations concerning:

a. Whether the system, equipment or component should be overhauled, and

b. The classification (in accordance with NAVSEAINST 4790.1) of repair/overhauls required to permit satisfactory performance throughout the operating cycle following the scheduled overhaul.

New RIR's shall be prepared in accordance with the below instructions only when previously developed RIR's are not adequate or available. Previously developed RIR's shall be updated for the specific hull in Blocks 1, 6, 8, 12 and 35.

The RIR shall be prepared in the following general sequence.

Blocks 1-6, 8-13 (as applicable to the system/equipment) 14, 15, 25 and 35; during preparation of the POT & I Plan prior to PERA/TYCOM approval.

Blocks 7 (as required) and 16-21; during the conduct of the Pre-Overhaul Inspection, after PERA/TYCOM approval. Recommend blocks 16-21 be legibly handwritten.

Blocks 22-34 (except block 25); after completion of the Inspection and POT & I when results are available to the overhaul shipyard. Recommend these blocks be legibly handwritten.

The following is a block description of the RIR. A sample RIR is included as page D-18 of the following sample POT & I Plan.

BLOCK NO.	TITLE	BRIEF
1.	SHIP & HULL NO.	Name of ship & hull number.

(continued)

TABLE D-1		
BLOCK NO.	TITLE	BRIEF
2.	NAME OF EQUIPMENT	Noun name of equipment or system, compartment name or area.
3.	SYSTEM	The system to which the component belongs.
4.	WBS/NO	The Work Breakdown Structure number as identified in the latest known NS 0900-039-9010.
5.	ITEM/NO	Use subdivision number of WBS in the index, e.g. 01, 02, etc. If separate RIR's are necessary to include all the equipment on board the ship in a given WBS subdivision, expand, adding a Sequence number, e.g. 01-1, 01-2, etc.
6.	LOCATION	Location of component, compartment, etc., if known; if blank, the inspector is to complete.
7.	APL/CID	For standard equipment only, leave blank if not applicable.
8.	ACTIVITY	Agency responsible for test or inspection.
9.	CODE/NO MEN	Code responsible for test or inspection and number of men required.
10-11.	CODE/NO MEN	Assist codes and number of men required.
12.	DURATION	Time in hours required to accomplish test and/or inspection. See Note 1 below.

(continued)

TABLE D-1

BLOCK NO.	TITLE	BRIEF
13.	DRYDOCK/PIER/SEA	Indicate whether the test or inspection will be accomplished at drydock, at pierside or during the sea trial.
14.	S.F. ASSISTANCE AND PREPARATION REQUIRED	Assistance required of Ship's Force during the POT & I; e.g. Light off pump for two hours prior, provide machinery history, open manholes, etc.
14A/B.	S.F. CONTACT/W.C.	Filled in by Forces Afloat.
14C.	MIP NO.	Applicable MIP, if any.
15.	INSPECTION/TEST DESCRIPTION AND REFERENCES	A brief description of the test/inspections; indicate specific documents that are required.
16.	CONDITION/TEST RESULTS CODE 190/240/225	The test results are entered here by the inspector. Unusual circumstances contributing to the deficiencies along with interferences necessary to be removed should also be noted. If no deficiencies are found, so state. See Note 2 below. Give a summary of the conditions found in concise terms. Make note of general conditions as well as specific deficiencies observed. (To minimize cost hand-written report is encouraged.)
17.	INSP. NAME	Name of responsible person making test or inspection.
19.	CODE	Code of responsible person making test or inspection.
20.	DATE	Date of inspection.

(continued)

TABLE D-1		
BLOCK NO.	TITLE	BRIEF
21.	RECOMMENDATIONS (SY/FA)	What is recommended to be done. Specific statements recommending class of repair/overhaul and accomplishing activity are required. If the recommendations do not reflect the test results or conditions, explanations and rational justifications should be made. General terminology is to be avoided. (To minimize cost it is encouraged that recommendations be hand-written.) All discrepancies resulting from CSMP AWR's shall contain the corres-ponding JCN.
25.	EIC	Equipment Identification Code as identified in the latest Master Index.
22-24; 16-34	(PLANNER'S INFO)	Leave blank until completion of POT & I.
35.	PG. NO.	Page No. shall consist of WBS number (Block 4) and Item number (Block 5), e.g. 255-01, 441-05-1, 441-05-2, etc. If there is more than one sheet to any Item number (Block 5), addition-ally assign letters to each individual sheet e.g. 123-01a, 123-01b, 445-01-1a, 445-01-1b, etc.

NOTE 1

The time span inserted is based on conducting the one particular test or inspection ONLY. Since numerous tests/inspections will be conducted concurrently in a particular area/system; the time span indicated will be decreased accordingly.

(continued)

NOTE 2

The "List of Deficiencies" referred to here should be derived as follows:

a. The ship will receive the CSMP Form 2K's from the cognizant COMCRUDES. PERA(CRUDES) updates the CSMP with the ship and provides a purified CSMP to the Shipyard.

b. In addition, identify any known discrepancies above and beyond those in the purged form 2K's. This can be done orally by ship's representative during inspection or by informal lists prior to inspection. Official lists are not required. The only intent here is to not overlook some deficiency known to Ship's Force.

SAMPLE

TITLE SHEET

USS

PRE-OVERHAUL TEST AND

INSPECTION PLAN

VOLUME

PREPARED FOR

PREPARED BY

APPROVED BY DATE

UNCLASSIFIED

FOR OFFICIAL USE ONLY

SAMPLE

PRE-OVERHAUL TEST AND INSPECTION PLAN

TABLE OF CONTENTS

Introduction

The POT & I Plan shall contain an introductory statement identifying the purpose, development and methodology of the Book. The introduction shall include information identifying related:

Specifications and Standards

Related Programs, e.g. Ship Alteration and Repair Package (SARP)

Administrative Requirements

POT & I implementation guidance

A typical sample is given below.

(SAMPLE)

INTRODUCTION

The Pre-Overhaul Test and Inspection (POT & I) Plan has been developed to provide documentation of the tests and inspections required to formulate a comprehensive repair package and further document the rationale for recommended repairs. It is the intent of this plan to identify and use to the maximum possible extent existing applicable Planned Maintenance System (PMS) procedures with which Ship's Force is familiar.

The meaningful overhaul of a ship depends to a great extent upon successful work definition. To achieve this the interest and active participation by Ship's Force personnel is essential in identifying a complete work package, and minimizing the cost and overall length of the overhaul.

By being actively involved Ship's Force can help ensure a complete, timely and successful Work Definiton Conference by:

(a) Assigning a POT & I coordinator
(b) Ensuring that deficiencies known to Ship's Force are clearly defined in the CSMP
(c) That deficiencies pertaining to the same systems and equipments provided independently by Ship's Force and other inspecting activities are purged of redundant entries. This avoids confusion during the Work Definition Conference since resolution of problems are restricted to one item rather than several.
(d) That as items are corrected or new work items are identified after POT & I, they are provided expeditiously and accurately to the CSMP to maintain the work package current

Other benefits derived from Ship's Force participation are:

(a) Helps to avoid the discovery of mandatory work late in the availability
(b) Provides time for ordering long lead time material
(c) Provides a measure of ship reliability
(d) Allows for definition of post-overhaul test requirements prior to the beginning of the availability

The Ship's Force should also submit copies of inspection reports developed by outside activities such as NOSSO, PEB, etc. with corresponding OPNAV 4790/2K Forms to further substantiate material conditions. These reports should be submitted in addition to other inspection requirements of the RIR, except that data from inspections conducted within four months of the POT & I can be used to complete the applicable portions of the RIR.

The POT & I Plan divides the ship into systems in accordance with the Ship Work Breakdown Structure (SWBS) for which Repair Inspection Records (RIR) have been prepared. The Records provide the name and location of the system and associated equipment(s) requiring inspection and/or test along with the inspection/test description and preparation/assistance required from Ship's Force to perform the test or inspection. This approach of dividing the ship into systems by SWBS, simplifies incorporation of the resulting recommendation for repair into a system-oriented work package such as a Ship Alteration and Repair Package (SARP) that is compatible with the Work Oriented Job Order (WOJO) System. Upon completion of the POT & I inspection, the actual material condition of the ship will have been defined along with the recommended action.

Implementation of the POT & I is conducted in three phases; at-sea, dockside, and in drydock. The at-sea or underway portion will require approximately ___ days at-sea period involving ___ shipyard personnel. The dockside phase will encompass the major effort and require approximately ___ working days and ___ personnel.

Portions of the POT & I shall be designated solely for Ship's Force accomplishment because it is well within their capability and normal PMS procedures are to be used to the maximum possible that will satisfy the intent of the POT & I. For these portions, the following guidance is applicable.

Ship's Force/Forces Afloat will accomplish the Inspection/Test in accordance with RIR Block 15 and shall report the results on Ship's Maintenance Action Forms, 4790/2K. Condition of equipments/systems and specific test results should be reported in as much detail as possible on the 2K Maintenance Forms and should indicate the WBS and Item Number, Blocks 4 and 5 of the RIR form. The JCN will be recorded in Block 16 of the applicable Repair Inspection Record. Utilization of existing CSMP documents is fully encouraged; and if adequate

4790/2K Forms for a particular equipment have previously been submitted into the CSMP system, enter in Block 16, "See CSMP JCN # ___."

However, if the CSMP documents do not completely describe the existing situation, the document may be corrected by changing the date in Block 25 to the current date and inserting any new data in the narrative section Block 43. Where a Test Memo is used the test data and recommendations shall be entered on the data sheets provided in the memo. These completed memos will then be submitted with the total POT & I report with reference in Block 16 to "See Test Memo for Data." Recommendations of the extent of repairs considered necessary are desired if they are accompanied by Test/Inspection results or specific operational problems which support the recommendations.

Recommendations to repair or overhaul an item based on the number of operational hours only are not desired unless accompanied by other supporting information such as frequent failure (indicate how frequent), inability to operate at rated values (indicate what values can be achieved), etc.

If no deficiency or problem exists as a result of following the instructions in Block 15, then Block 16, Condition Report, of the applicable Repair Inspection Record will be marked "NO WORK REQUIRED" and no 4790/2K Form need be used.

All new 4790/2K's will be processed in the normal manner for deferred action to update the CSMP with an additional copy prepared for Repair Inspection Record purposes. Each of these additional 4790/2K's utilized will be identified in the upper left corner by the Page Number of the applicable Repair Inspection Record and then stapled to same.

In Section IV, REMARKS/DESCRIPTION of the 4790/2K, give a comprehensive statement of conditions or deficiencies found. Critical information such as the name of equipment/system/service affected, location of problem, manufacturer's name, type, size, quantity, interference, etc., should be noted. The following Test/Inspections are normally considered to be only Shipyard/Shore Station responsibility:

WBS	Test
Various	Vibration (Docked prior to arrival)
161/163	Drydock Inspection of Sea Chests, Castings & Forgings
165	Drydock Inspection of Sonar Domes
221	Boiler Inspection (Unless ship has a Certified Boiler Inspector. If not, ship should set up boiler inspection by TYCOM Boiler Inspector)

WBS	Test
243/244	Propeller Shafting/Bearing Inspection
245	Propeller Inspection
512	Cubic Feet per Minute (CFM) measurements only
562	Drydock Rudder Inspection

In other cases where Test/Inspections cannot be performed by Ship's Force alone, a list of the known deficiencies should be attached to the report sheet. Many tests which can be accomplished at sea are listed to be performed dockside. Ship's Force should schedule their inspections whenever convenient for the ship.

The terms "Ship's Force" and "Force Afloat" have been used interchangeably. No difference in meaning is intended.

The results of the Ship's Force responsible portion of the POT & I combined with the Shipyard's and TYCOM's inputs can be translated into a total overhaul work package. The quality of the POT & I is directly related to the mental and physical input of the inspectors. A good definition of the work package requires a diligent and thorough team effort by the Ship's Force, TYCOM, PERA(CRUDES), and Shipyard working toward a common goal of obtaining the current material condition of the ship.

This page intentionally blank

SAMPLE

POT & I INDEX

The POT & I Plan shall contain an Index (listing) of the recommended systems and equipment to be evaluated during execution of the POT & I. The Index shall be continuous by WBS System Numbers and for each system/equipment shall provide:

Work Breakdown Structure to 3 digits from NAVSHIPS 0900-039-9010
Item Number - assigned to separate groups within WBS categories
Equipment Identification Code (EIC) to 4 digits from MSO 4790.E2579
Inspection/Test procedure to be used
Phase(s) required for that event of POT & I (at sea, pierside, etc.)
Recommended performing activity

The specific POT & I Index for each ship shall include only those applicable items. The next page is a sample completed Index Page.

The POT & I Plan shall be sub-divided into separate sections for:

Ship's Force requirements
Shipyard At-Sea requirements
Shipyard Dockside requirements
Shipyard Drydock requirements

The RIR's within each section shall be sub-divided into the following Major Ship System WBS categories with each category separated by an identifying Index Tab:

WBS	Category
100	Hull Structure
200	Propulsion Plant
300	Electrical Plant
400	Command and Surveillance
500	Auxiliary Systems
600	Outfit and Furnishings
700	Armament

A sample RIR sheet is included, page D-18.

PRE-OVERHAUL TEST AND INSPECTION INDEX

WBS		EIC	SYSTEM/EQUIPMENT	TEST/INSPECTION TITLE	REF DOCUMENT	PERF* DS	PERF* AS	RESP
254			CONDENSERS & AIR EJECTORS					
	01	FA01	Condenser - Main	Operational Inspection	TP254FA010010	X	X	SY
	02	FA03	Air Ejector - Main	Operational Inspection	TP254FA010010	X	X	SY
	03	310E	Condenser Aux SSTG	Inspect during TG Test	TP254310E0010	X		SY
	04	310E	Air Ejector - Aux SSTG	Inspect during TG Test	TP254310E0010	X		SY
324	09	4309	ABT	1. Visual Inspection	MIP:EL-10/20;MRC: S-1	X		FA
				2. Operational Test	MIP:EL-10/20;MRC: M-1	X		FA
				3. Insulation Resistance		X		FA
324	10	430A	MBT	1. Visual Inspection	MIP:EL-10/20;MRC: A-1	X		FA
				2. Operational Test	MIP:EL-10/20;MRC: Q-1	X		FA
				3. Insulation Resistance		X		FA
423	04	L303	AN/SRN-12 OMEGA Receiving Set	1. Test oscillator Frequency and Receiving Set	MIP:C-401/1;MRC: M-1	X		SY
				2. Test Antenna Matching Transformer	MIP:C-401/1;MRC: S-1	X		SY
424	01	R50P	AN/UQN-1C Sounding Set	1. Measure Insul. Res. and Impedance	MIP:SO-4/4;MRC:S-1	X		SY
				2. Test Operation	MIP:SO-4/4;MRC: W-1R/Q-3R		X	SY
				3. Receiver Sensitivity & XMTR Output Measurement	MIP:SO-4/4;MRC:Q-1	X		SY
441	05	QB1B	AN/URR-44 Receiving Set	1. Receiver Sensitivity Meas.	MIP:C-52/1;MRC:Q-1	X		SY
				2. Inspect & Operate Set	MIP:C-52/1;MRC:A-1	X		SY
521	03	T800	Pump - Fire, M.D.	Operational Test & Insp.	TP521T8000010	X		SY

* DS - DOCKSIDE: AS - AT SEA

SAMPLE – POT & I INDEX

TS NO. 4730-100

REPAIR INSPECTION RECORD
4ND-PNSY-9310/8

1. SHIP & HULL NO.
USS NEVER SAIL (DDG-000)

2. NAME OF EQUIPMENT	3. SYSTEM	4. WBS/NO.	5. ITEM/NO.
BLOWER - FORCED DRAFT	COMBUSTION AIR SERVICE	251	01

6. LOCATION	7. APL/CID
FIRE ROOM #	057800137

8. ACTIVITY	9. CODE/NO. MEN	10. CODE/NO. MEN	11. CODE/NO. MEN	12. DURATION (A) TEST	12. DURATION (B) INSP	13.
SHIPYARD				4 HR		DRYDOCK
						XX PIER
						SEA

14. S.F. ASSISTANCE AND PREPARATION REQUIRED:

1. Operate equipment as requested.
2. Provide list of known discrepancies to SY Inspector.
3. Ensure all thermometers and gages are in place; oil is at proper operating level; coolers lined up; gland exhauster in operation and sump free of water.

S.F. CONTACT

W.C.

MIP NO.

15. INSPECTION/TEST DESCRIPTION AND REFERENCES:	TECH. MAN. NO.	TEST MEMO NO.	PLAN NO.
	NS	251F401	

1. Inspect and test in accordance with referenced Test Procedure.
2. The data sheets shall be filled out and attached to the Repair Inspection Record.

16. CONDITION/TEST RESULTS CODE 190/240/225	17. INSP. NAME	19. CODE	20. DATE
	Barton	260.12	1-24-75

See attached sheets.

21. RECOMMENDATIONS (SY/FA):

1B1 Class "B" overhaul of entire machine.
1A1 Class "C" overhaul limited to repair and alignment of steam inlet control valve operating linkage.
1B2 Install exhaust pressure gage and Calibrate steam pressure gage.
1A2 No work required.

22. JOB TITLE	23. FCN	24. JCN	25. EIC
			F 4 0 1 0 0 0

SHOP	11	17	24	26	31	36	38	41	51	56	64	67	71	72	99					

27. PLANNER I.D.

SALES ESTIMATE

28. M/H	29. MAT'L	30. M/H	31. LABOR	32. OV'HD	33. MAT'L	34. TOTAL

TS NO. 4730-100

1200 PSI STEAM PROPULSION PLANT
SHIPBOARD TEST PROCEDURE
NO. 254F4010011
DATA SHEET C
MAIN FORCED DRAFT BLOWER NO. 1A1

	RESULTS SAT	RESULTS UNSAT
Prerequisite to Inspection		
Installation	✓	
Duct work connections	✓	
Steam connections	✓	
Inlet nozzles	✓	
Shutters installed	✓	
Dampers and actuators	✓	
1. Inspection		
Cleanliness		✓
Accessibility	✓	
Supports	✓	
Bolts	✓	
Casings, joints, seals	✓	
Foundations and hold down bolts	✓	
Foundations (rusting, pitting, cracks)	✓	
Lubrication	✓	
Lagging and insulation	✓	
Label and identification plates	✓	
Moveable parts		✓
Ducts	✓	
L.O. Analysis (0.50 or less neutralization number and no emulsification	✓	
Prerequisite to Operation		
Freedom of rotation	✓	
Control mechanism		✓
Lube oil filter clean	✓	
Lube oil cooler	✓	

	Acceptance Criteria	Actual	SAT	UNSAT
Lube Oil relief valve	14.5 to 15.5 PSIG (DDG2-19) 9.5 to 10.5 PSIG (DDG20-24)	15	✓	

DISCREPANCIES/REMARKS

Note: See attached recommendation sheet.

1-24-75 Burton
DATE SIGNATURE

TS NO. 4730-100

1200 PSI STEAM PROPULSION PLANT
SHIPBOARD TEST PROCEDURE
No. 251F4010011
DATA SHEET D
MAIN FORCED DRAFT BLOWER NO. 1A1

OPERATION PARAMETERS (Initial Light-Off)	ACCEPTANCE CRITERIA	READING MINUTES				
		00	15	30	45	60
Pressure, Windbox	5-10" H_2O	9	9	9	9	9
RPM	1000 - 4000	2600	2600	2600	2600	2600
Steam Pressure	900 to 1190 PSIG	1100	1100	1100	1100	1100
Exhaust Pressure	13 to 17 PSIG	15	15	15	15	15
Cooler Oil Temp. In	125^{o}F Min (DDG2-19) 120^{o}F Min (DDG20-24)	150	150	150	150	150
Out	135^{o}F Max (DDG2-19) 130^{o}F Max (DDG20-24)	130	130	130	130	130
Bearing Supply Oil Pressure	12-15 PSIG (DDG2-19) 8-10 PSIG (DDG20-24)	13	13	13	13	13
Steam Temperature	600^{o} to 675^{o}F (Desuphtr Outlet)	650	650	655	655	660
Bearing Temperature Inlet		130	130	130	130	130
Outlet	180^{o}F Max.	150	150	150	150	150
Input Air Signal	3-27 PSIG (DDG2,3,7,8, 10-13) 3-15 PSIG (DDG4-6, 9, 14-19) 0-25 PSIG (DDG20-24)	11	11	11	11	11

	Acceptance Criteria	Actual	RESULTS SAT	UNSAT
Noise and vibration			✓	
Piping, Piping connections and glands				✓
Speeding Limiting Governor	8120 to 8200 RPM	8150	✓	
Combined Exhaust/Relief Valve	+2 PSIG above aux. exhaust line pressure		✓	
Safety Position	Dumps to bilge		✓	

DISCREPANCIES/REMARKS

Excessive steam leaking from steam inlet control valve steam.

1-24-75 Barton
DATE SIGNATURE

TS NO. 4730-100

1200 PSI STEAM PROPULSION PLANT
SHIPBOARD TEST PROCEDURE
NO. 251F4010011

DATA SHEET E
MAIN FORCED DRAFT BLOWER NO. 1A1

OPERATION PARAMETERS (Full Power)	ACCEPTANCE CRITERIA	READING MINUTES 00	15	30	45	60
Pressure, Windbox	40 to 50" H_2O	43	43	43	43	43
RPM	5700-5900 (DDG2,3,7,8,10-13)					
Local Tachometer	5600-5800 (DDG4-6,9,14-19)	5700	5700	5700	5700	5705
Remote Tachometer	5200-5400 (DDG20-24)	5650	5650	5650	5650	5650
Steam Pressure	1050-1150 PSIG	1100	1100	1100	1100	1100
Exhaust Pressure	13-17 PSIG	15	15	15	15	15
Cooler Oil Temp. In	125°F Min (DDG2-19) 120°F Min (DDG20-24)	160	160	160	160	160
Out	135°F Max (DDG2-19) 130°F Max (DDG20-24)	130	130	130	130	130
Bearing Supply Oil Pressure	12-15 PSIG (DDG2-19) 8-10 PSIG (DDG20-24)	13	13	13	13	13
Upper Bearing Oil Temperature	180°F Max	165	165	165	165	165
Steam Temperature	600 to 675°F	650	650	650	650	650

	Acceptance Criteria	Actual	Signal (PSIG from A/M Station	RESULTS SAT	UNSAT
Noise and vibration				✓	
Piping, Piping Connections, glands					✓
Remote manual control					
3100 to 3600 RPM	Blower satisfactorily			✓	
5100 to 5600 RPM	controlled from			✓	
7100 to 7600 RPM	remote station			✓	
Lube Oil Pump Reversing Feature (DDG2-19)	Oil flows through blower bearing			✓	
Parallel Operation Test Blower No. 1 RPM DDG2,3,7,8,10-13	Blower No. 2 RPM				
3700	3500 to 3900	3650	13	✓	
5800	5600 to 6000	5800	19	✓	
7700	7500 to 7900	7750	25	✓	

DISCREPANCIES/REMARKS

(Use back of sheet)

1-24-75 Barton
DATE SIGNATURE

Discrepancies / Remarks

Steam inlet control valve sticks in high speed range. Although unit can be paralleled, valve operation is not smooth. Excessive steam leakage past valve stem indicates packing not too tight. Suspect valve operating linkage not properly aligned.

1200 PSI STEAM PROPULSION PLANT
SHIPBOARD TEST PROCEDURE
NO. 251F4010011
TABLE I
PRESSURE AND TEMPERATURE GAGES
MAIN FORCED DRAFT BLOWER NO. 1A1

GAGE	RANGE	SERVICE	DATE CALIBRATED	DATE SATISFACTORILY INSTALLED
Oil Pressure to bearings	0-30 PSIG	Lube Oil	3-15-73	
Oil Temp. from bearings	30°-240°F	Lube Oil	3-15-73	
Oil Sump Temperature	20-180°F*	Lube Oil	3-15-73	
Oil Temp. to Cooler	30°-240°F**	Lube Oil	3-18-73	
Oil Temp. from cooler	30°-240°F**	Lube Oil	3-18-73	
Local Tachometer	0-9000 RPM***	Turbine	3-17-73	
Steam Pressure	400-1500 PSIG	Turbine	3-18-73	
Exhaust Pressure	0-60 PSIG	Turbine	3-17-73	

NOTE 1 Indicate if gage is not installed or if additional gages are installed.

NOTE 2 Record actual range of each gage.

SAMPLE

TEST/INSPECTION PROCEDURES

The POT & I Plan shall contain locally prepared inspection/test procedures as an attachment. Existing test and inspection procedures are to be used to the maximum practical extent. Sources of standard procedures are:

System Level Planned Maintenance System (SL/PMS) procedures
Planned Maintenance System Equipment Maintenance Requirement Cards (PMS/MRC)
Shipyard Test Memoranda
Technical Specifications
Systems Command System/Equipment Documents
Process Instructions

No new procedures shall be developed without prior approval of PERA(CRUDES). All new procedures developed shall comply with NAVMATINST 4790.5.

APPENDIX-E

SHIP ALTERATION AND REPAIR PACKAGE

(SARP)

General Description

The Ship Alteration and Repair Package (SARP) is a compilation of all work to be accomplished during the overhaul of a specific ship. It is an integration of the ship's alteration and repair work packages.

The complete alteration work package consists of NAVSEA authorized ShipAlts and OrdAlts and TYCOM authorized ShipAlts. The repair work contained in the SARP is developed from the POT & I, Ship's CSMP, and Overhaul Routines.

There are two editions of the SARP for each overhaul. The first version, containing the alteration and repair work packages described above, is called the Proposed SARP. It is used as the working document for the Work Definition Conference. The Proposed SARP is revised to reflect screening decisions made during the Work Definition Conference. It is then promulgated as the Authorized SARP.

Purpose

The Authorized SARP

1. Integrates related work requirements.

2. Resolves redundant and conflicting work requirements.

3. Identifies overhaul work on a ship system basis.

4. Is a single source document listing all authorized and proposed work.

As a compendium of all work to be accomplished during the overhaul with an assignment of an accomplishing activity - Forces Afloat or Shipyard - for each work item, the Authorized SARP becomes a contractual document between the TYCOM and the Shipyard for all work that has been authorized for shipyard accomplishment. It is the Shipyard's authorization to perform the indicated work.

During the course of the overhaul, the Authorized SARP is amended to reflect changes that are made to the work package. It then becomes a historical document listing all work that was accomplished, enabling it to be used to advantage in

1. Estimating future overhaul durations.

2. Estimating future overhaul budgets.

3. Updating the ship's CSMP.

4. Preparing the Shipyard Departure Report.

Responsibilities

Considering the nature of the SARP, its required inputs, and the process through which it evolves, responsibilities concerning the development and application of the SARP are:

1. PERA(CRUDES) - insure the integration of all inputs to Alteration and Repair Work Packages into a comprehensive, accurate Ship Alteration and Repair Package.

2. NAVSEA - identifies the Title "K" Alterations and ORDALTS authorized for accomplishment during the forthcoming overhaul.

3. TYCOM - inputs the Title "D" ShipAlts he is authorizing for accomplishment as part of the Alteration Work Package. TYCOM also provides deferred work items from the Ship's CSMP which are to become a part of the Repair Work Package for accomplishment during the forthcoming overhaul.

4. Shipyard - if tasked by PERA(CRUDES), develops the SARP. Executes designated portions of the POT & I Plan and prepares POT & I Report to ensure adequacy of repair data from this source into the SARP.

5. Ship - maintain up-to-date CSMP including timely entry of INSURV discrepancies and other inspection results; execute designated portions of POT & I Plan; review Proposed SARP and POT & I Report to ensure that all ship systems are adequately covered (immediate notification of omissions should be addressed to the TYCOM, PERA(CRUDES), and the shipyard).

The Proposed SARP shall be used by all commands and activities involved in preparing for the Work Definition Conference and formulation of the Authorized SARP.

Example.

An example of a Ship Alteration and Repair Package (SARP) is included in the following pages of this Appendix.

PERA (   )

USS_________(______)

SHIP ALTERATION AND REPAIR PACKAGE

(SARP)

PREPARED BY

____

FOR OFFICIAL USE ONLY

USS -----------(HULL NO.)

SHIP ALTERATION AND REPAIR PACKAGE

TABLE OF CONTENTS

SARP PART 1

GENERAL INFORMATION

Ref: (a) TYPE COMMANDER INSTR (as assigned)
(b) PERA(CRUDES) ltr 2403:RGL:ljb Ser 1348 27 Dec 1971
(c) PERA(CRUDES) Ship's Force Overhaul Management System (SFOMS)
(d) Current Ship's Maintenance Project (CSMP) 6 Jan 1972
(e) Coordinated Shipboard Allowance List (COSAL) 1 Mar 1969 appendix to 15 Dec 1967
(f) Ship Electronics Installation Record 5 Sept 1967
(g) Armament of Naval Vessels 24 Jun 1971
(h) Board of Inspection and Survey Report 19 Apr 1971
(i) Ship Work Requests
(j) Opnav Inst. 43P2 with Change 3, and Inst. 4790.4 of 1 June 1973

1. Purpose and Scope

a. The Ship Alteration and Repair Package (SARP) is a compilation of work to be accomplished by the Shipyard and Associated Forces Afloat Activities for a forthcoming overhaul. The SARP consists of: NAVSEA-SYSCOM authorized SHIPALTS, authorized OrdAlts, NAVELEX authorized Field Changes, all identified Repair work, and authorized Forces Afloat Work. The repair work described herein was developed from Type Commander Recurring Overhaul Work Items, CSMP, the Pre-Overhaul Test and Inspection Program and Shipyard Repair Shipcheck. Supplementary Work Items will be integrated into this work package after approval by the cognizant Customers.

b. The SARP:

(1) Integrates related Customer work requirements.

(2) Resolves redundant and conflicting work requirements.

(3) Identifies work on a Ship System basis.

(4) Is a single source document of all Customer authorized work.

c. The SARP will be updated periodically and upon overhaul completion to reflect necessary changes, thereby providing information for:

(1) Estimating the overhaul cost and overhaul duration.

(2) Early decision-making by higher levels of command concerning assignment of work to specific repair/overhaul activities, budgeting, funding, and overhaul action.

GENERAL INFORMATION (Cont)

(3) Commencement of additional advance planning, design work, and material procurement by those activities responsible for supporting and conducting the overhaul.

(4) Updating ship's CSMP at overhaul completion.

(5) Assuring comprehensive Shipyard Departure Report.

(6) Historical data for future shipclass overhaul actions.

2. Work Authorizations

Shipyard overhaul work shall not deviate from Ship's System Work Descriptions (SSWD's) requirements provided herein without prior authorization by appropriate Customer.

Necessary additional work and unnecessary (previously authorized) work that has been identified from the results of authorized tests and/or inspections; or has emerged from the conduct of ship's overhaul must be reported, with recommendations, to cognizant Customers. Advance notification of required changes to authorized work and subsequent authorization of changes in critical path work elements shall be made by naval message or telephone to preclude delays after commencement of overhaul.

Authorization to test or open and inspect an item includes authorization to correct minor deficiencies such as replacing damaged gaskets, etc. When it is obvious that such repairs should be accomplished, work should proceed (within available funding allowance) with notification to the cognizant Customer occurring at first opportunity. Repairs other than minor will be referred to the cognizant Customer with recommendations for corrective action prior to work commencement.

3. Pre-Overhaul Test and Inspection (POT & I) Program

a. Pre-Overhaul Test and Inspection Program will be conducted prior to overhaul to accurately determine the extent, if any, of refurbishment necessary. The POT & I results shall be incorporated in a consistent report which shall be a source document for the repair work items listed in the SARP.

b. Repairs and refurbishment identified by the POT & I as candidates for accomplishment during overhaul shall be limited to those that are necessary to insure safe and reliable operation throughout the next operating cycle. Refurbishment to a "like new" condition is not intended.

c. The Overhaul Yard and Forces Afloat shall accomplish and evaluate POT & I's using a POT & I Plan provided separately. Actual operation of Ship Systems and equipment while conducting the POT & I is a Ship's Force function.

GENERAL INFORMATION (Cont)

d. The Current Ships Maintenance Project (CSMP) shall be used in the execution of the POT & I Plan as an input to systems or equipment problems.

e. A technical availability may be established prior to start of the overhaul exclusively for accomplishing POT & I. This availability may include one or more days of underway tests. Supplementary ship checks, if required, will be accomplished as needed.

4. Work Lists

Work Lists will be submitted in accordance with the following requirements and individual TYCOM Directives:

a. Initial Work Lists are submitted on Form 4790/2K in accordance with Type Commander Instructions.

b. First Supplementary List - submitted to Shipyard, Type Commander, and other repair activities on Form 4790/2K during or after the completion of POT & I, but no later than three weeks prior to the Work Definition Conference.

c. Subsequent Supplementary Work Items - submitted as new mandatory requirements are identified.

The Work Requests which comprise Work Lists should be submitted in accordance with Type Commander policies.

A Work Definition Conference between the Ship, ISIC, Type Commander, NAVSEA, concurrent TAV Tender, PERA(CRUDES) and the Overhauling Yard will be convened prior to ships' arrival in overhaul yard to assure all Customer work requirements are incorporated into the SARP.

5. Ship's Force Work

The assignment of work in the SARP is divided between Shipyard and Forces Afloat. Assignment to the shipyard by the appropriate Customer at the Work Definition Conference is an authorization for the accomplishment of the indicated action and the Shipyard's basis for initiating advance planning and material ordering. Assignment and scheduling of work to be accomplished by the Forces Afloat is the responsibility of the Commanding Officer of the ship to ensure that the system or component is in satisfactory material condition required to support the integrated overhaul effort. (The exact time when this responsibility must be met depends upon the Shipyard Milestone Schedule). The SFOMS Industrial Work Package as submitted by the ship in accordance with reference (c) is denoted by FA* in the assignment column. The Commanding Officer may use any of the following to accomplish work assigned to Forces Afloat.

a. Ship's Force Planned Maintenance Subsystem (PMS) or Phased Maintenance During Overhaul (PMDO).

GENERAL INFORMATION (Cont)

b. Tender Work Request for Forces Afloat accomplishment.

c. ASF Fund.

6. Overhaul Cost and Duration

The Shipyard shall provide all Customer "planning cost estimates" and an estimate of overhaul duration. Cost estimates shall be provided for each System Work List Item Number (SWLIN) for alterations and each repair line item (manhours for Forces Afloat work) in SARP, Part 3.

7. Advance Material List

The Advance Material List is developed by the overhaul activity as the requirements are identified (POT & I Reports, Shipchecks, etc.) for all work items contained in the SARP that have been assigned a category 1 or 2 priority. The overhaul yard shall refer this material requirement to the cognizant Customer for authorization of procurement. Material received for work that is subsequently re-assigned to Forces Afloat will be retained at the Shipyard until receipted for by the ship.

Work priority categories are defined as follows:

PRIORITY	
1	Mandatory repairs to ensure safe and reliable operation of the ship over the ensuing operating cycle between planned regular overhauls.
2	Necessary or desirable repairs not affecting a critical shipboard component subsystem which should be accomplished to ensure safe and reliable operation of the component/subsystem over the ensuing operating cycle between planned regular overhauls.
3	Minor repairs not affecting ship safety or equipment reliability which can be deferred for economic reasons.
4	Convenience items.

8. Assignment

Each line of a SWLIN has a designation in the ASSGMT column, i.e., SY, SY/FA, or FA. SY is a Shipyard responsible work item and will have a cost estimate included. SY/FA is a combination of responsibilities and only the Shipyard portion is included in the COST $ column. FA is a Forces Afloat responsible work item and will not have a cost estimate. Forces Afloat work items scheduled for accomplishment prior to ship's arrival at the industrial activity will be designated by FA #.

GENERAL INFORMATION (Cont)

9. Work Definition Conference Results

A Work Definition Conference will be held approximately three-months prior to start of overhaul in order to review and define the Authorized SARP.

10. Changes

Changes to the Authorized SARP shall be forwarded by message or letter at intervals to keep the SARP current. The changes will include all modifications to the SARP authorized subsequent to the previous change and will be incorporated in the Record of Changes.

11. Ship's Force Overhaul Management System (SFOMS)

A management system for use in planning, executing, and monitoring of the Ship's Force efforts during overhaul.

SARP PART 2

PREFACE

1. SARP Part 3 is a complete sequence listing all alterations and repair work and serves as the primary document to establish the preliminary and final Shipyard/Forces Afloat Regular Overhaul Work Package. Part 3 is indexed by Major Ship Systems (see paragraphs 3.0 through 3.9). Each Major Ship System is sub-divided into Ship Systems. The Ship Systems are listed at the start of each sub-section to Part 3.

Aforementioned work items are contained in the Ship System Work Descriptions (SSWD's) associated with each Ship System listed in the subsections of Part 3. Each SSWD is identified by the SWLIN designators. The designator identifies:

a. The affected Ship System.

b. The type of work (i.e. ShipAlt, OrdAlt, maintenance, etc.).

c. The Customer (i.e. NAVSEA, TYCOM, etc.).

The SWLIN classifications, Ship System boundaries, and cost estimating terms used in Part 3 are further defined in the Glossary (Part 6).

Whenever reference is made to a particular SWLIN, an asterisk (*) is used in place of the revision letter, e.g., "... conducted under SWLIN 986L01*".

2. SARP Part 4 provides a cross-index of source data (ShipAlts, OrdAlts, authorized Type Commander Recurrent Items, Shipyard Recurrent Items, Material Inspection Items, etc.), to applicable SWLIN's in Part 3.

3. SARP Part 5 contains a detailed record of all changes made to the SARP, when authorized.

4. SARP Part 6 is a Glossary of terms unique to the SARP.

5. The following table is a list of effective SWLIN's for Issue I of the USS (Ship's Name). In addition, it provides traceability of SWLIN changes to SARP issues (see Key).

Key: A SWLIN was established or added
R SWLIN was revised
D SWLIN was deleted

PREFACE (Cont)

SWLIN	SARP Issue I (Proposed)	SARP Issue I
110A01A	A	
120A01A	A	
124A01A	A	
130A01A	A	
131D01A	A	
140A01A	A	
141A01A	A	
150A01A	A	
154A01A	A	
155A01A	A	
163A01A	A	
165D01A	A	
169D01A	A	
221A01A	A	
221C02A	A	
221C03A	A	
221D04A	A	
231C01A	A	
240A01A	A	
241A01A	A	
251D01A	A	
251D02A	A	
252D01A	A	
252D02A	A	
252D03A	A	
253A01A	A	
253D02A	A	
253D03A	A	
255D01A	A	
255A02A	A	
257A01A	A	

Note: Only the first sheet of the list of effective SWLIN's is included herein as a sample.

Record of Changes for Issue -(Date of Issue)

SWLIN	Description of Change	Authority
(SWLIN affected by change.)	(Brief description of change.)	(Document authorizing change.)

SARP PART 4

(Title of Appropriate Section of Cross-Index)

WLI	Title	SWLIN	Remarks
(Identifying No. of Item; i.e., S/A Routine Item No.)	(Title of Item.)	(If item is authorized in Part 3, use SWLIN where authorized.)	

USE FOR URGENT LETTERS ONLY

NAVAL SPEEDLETTER

DO NOT CLEAR THROUGH COMMUNICATION OFFICE

UNCLASSIFIED

IN REPLY REFER TO

DATE

TO: Commander
Naval Surface Force
U.S. Atlantic Fleet
Norfolk, Virginia 23500

NAVAL SPEEDLETTER—

Permits dispatch in informal language.

May be sent (1) with enclosures, (2) in window envelope (size 8¾" x 3⅞"), if contents are not classified as confidential or higher, (3) to both naval and nonnaval activities.

Subj: USS NEVERSAIL (DD XYZ) ROH; change 10

Ref: (a) FONECON - LCDR D. Plenty (BNSY)/LT Jones (CCDL) of 28 Jun 1975
(b) FONECON - LCDR D. Plenty (BNSY)/LT Jones (CCDL) of 12 Sept 1975
(c) USS NEVERSAIL (DD XYZ) SARP of 11 April 1975
(d) NAVSHIPS 051808Z Sep 1975
(e) FONECON - Mr. Smith (BNSY)/LT Green (CCDL) of 10 Oct 1975

Encl: (1) SWLIN 462D04C
(2) SWLIN 221D01A

1. Confirming references (a) and (b), the following revisions to reference (c) have been made for work modifications authorized by references (d) and (e):

a. Replace SWLIN 462D04B, pages 1 and 2, with enclosure (1).

b. Add new SWLIN 221D01A, enclosure (2). Add following to ShipAlt Cross-Index pages:

WLI: DEG1-164K; Title: "Install AN/WQC-1 U/W Telephone"; SWLIN: 221D01A; Remarks: Change 10.

c. Change SWLIN 634A01A Line Item 2 to read:

"Renew terrazzo deck in five shower stalls (WC/sh 2-98-2-6) M/D 16 MATL $500 COST $2,100 ASSGMT SY PRI A"

2. Increased funding will be the subject of separate correspondence. This spdltr is change ten to reference (c).

DESRON ______________
USS ______________
PERA (______________)

ADDRESS Commander
Boston Naval Shipyard
Boston, Mass. 02100

PLATE NO. 17968

SARP Format for Record of Changes

Record of Changes for Issue - (Date of Issue)

SWLIN	Description of Change	Authority
(SWLIN affected by change.)	(Brief description of change.)	(Document authorizing change.)

SARP Part 5 - Record of Changes

GLOSSARY

Calibration - The process by which Standards and Calibration Laboratories and qualification activities compare a standard (test or measuring equipment or instrument) with a standard of higher accuracy to ensure that the former is within specified limits throughout its entire range. The calibration process involves the use of approved instrument calibration procedures and includes adjustments or incidental repair necessary to bring the standard or instrument being calibrated within specified limits.

Classification of Repair or Overhaul - The following definitions from NAVSEA INST 4790.1 Change 4, 9 July 1973 apply to terms used in SARP, Part 3.

1. Class B Work which requires such overhaul or repairs as will restore the operating and performance characteristics of a system, sub-system, or component to its "original" design and technical specifications. If it is required to restore the operating and performance characteristics of an item to other than its original design and technical specifications, it must be so specified and the performance criteria defined. SHIPALTS, ORDALTS, field changes and modifications, even if applicable, are not to be accomplished unless specified by the Customer. Maintenance adjustment and calibration routines specified by the applicable instruction manual, unless superseded by authority, are required. The repair activity will demonstrate that the end product successfully meets all performance criteria specified by the governing specifications.

2. Class C Repair work on a system, sub-system or component specified by the work request or that work required to correct the particular deficient conditions or malfunctions specified by the Customer. The repair activity must demonstrate that the work requested has been accomplished or that the conditions/ malfunctions described have been corrected, but the repairing activity has no responsibility for the repair or proper operation of the associated components of the equipment or for the operation of the system/sub-system equipment as a whole.

3. Class D Work associated with the "Open, Inspect and Report" type of work request where the Customer cannot be specific about what is or may be wrong with the item.

Part 6

GLOSSARY

CLASS D CONT — This class of work is intended to be diagnostic in nature and thus depending on the type of equipment, may require various tests, followed by inspection to assist in a complete diagnosis. The repair activity will report findings, recommendations, and cost estimates to the Customer for authorization prior to any repair work being accomplished. When requested by the Customer, minor repairs and adjustments may be accomplished without prior authorization to the extent specified.

Cost Estimating - The following definitions apply to the cost estimating terms used in SARP, Part 3.

1. M/D - Man-days for the work in the direct accomplishment of the applicable SWLIN and directly chargeable to Customer funds.

2. MATL $ - Costs, in dollars, for all material (includes all equipment, components, assemblies, contractor support, etc.) provided by the Shipyard for accomplishment of the SWLIN. The cost does not include Government Furnished Material (GFM) and centrally procured Long Lead Time Material (LLTM) provided to the Shipyard.

3. Cost $ - The sum, in dollars, of M/D and Material Costs to be charged to the Customer for work accomplished.

4. Total Shipyard Cost - The total SWLIN cost (in dollars) directly chargeable to Customer funds.

Customer An activity (e.g. NAVSEA, Type Commander) that possesses the authorization and funds for the accomplishment of overhaul work.

EIC (Equipment Identification Code - A four digit alphanumeric code used in the 3-M (Maintenance and Material Management) System to identify system, sub-system, and the equipment on which maintenance is performed. The EIC and its relation to the 3-M System is further defined by Maintenance Data Collection System EIC Manual.

Forces Afloat Activities - Ship's Company, Tenders, DATC/FMAG, MOTU and other such agencies as arranged by the Type Commander.

Grooming - The process of alignment, adjusting and replacing marginal parts within an operational unit or system so that the unit or system will meet the tolerance requirements. This is not to be interpreted as a refurbishment or restoration of a unit or system.

JCN (Job Control Number) - A 13 digit alphanumeric code which correlates 3-M System documents submitted on a specific work item. The first five digits identify the ship, are common to all SWLIN's, and are not

GLOSSARY

repeated throughout the SARP. Only the last eight digits appear in each SWLIN (Work Request Number).

Overhaul Maintenance - The process of servicing equipment for the purpose of retaining it in operational condition. Overhaul maintenance normally includes lubricating, adjusting, calibrating, cleaning and replacement of certain consumable parts. Overhaul maintenance is distinguished from "refurbishment" in that overhaul maintenance preserves or restores equipment to such a condition that it may be effectively utilized for its designed purpose without appreciably adding to its permanent value or prolonging its intended life.

Refurbishment - Restoring equipment in accordance with specified standards for the purpose of extending its operational life. It normally includes disassembly, inspection, cleaning, replacement of parts, re-assembly, and inspection and testing.

Ship System - A combination of parts, assemblies and components on a ship perform a specific function or functions. The Ship System used in the SARP provides manageable hardware units suited to overhaul work. NAVSHIPS 0900-039-9010 defines the numbering, contents and boundaries of the Ship Systems used (see SWBS).

Ships Systems Work Description (SSWD) - See Tab-A.

SWBS (Ship Work Breakdown Structure) - A single language numbering structure for defining Ship System boundaries (NAVSHIPS 0900-039-9010).

SWLIN (System Work List Item Number) - A seven digit alphanumeric code used in SARP, Part 3 to identify overhaul work on a Ship System basis. The SWLIN is further defined in Tab-A.

Tested - The process (using a comparator) Forces Afloat utilizes to analyze gages, to determine proper operation. These gages are labeled to indicate date tested, due date, and initials of person performing test.

WLI (Work List Item) - is the source of the individual items such as ShipAlts, Trial Board Item, etc.

TAB-A

SHIP SYSTEM WORK DESCRIPTION

ATTACHMENTS: (1) SWLIN Structure
(2) Standard SWLIN Form (Lead)
(3) Standard SWLIN Form (Continuation)
(4) Sample Maintenance SWLIN
(5) Sample ShipAlt SWLIN
(6) Sample OrdAlt SWLIN

A-1. Scope. This appendix defines requirements for Ship System Work Descriptions.

A-2. References. None.

A-3. Ship System Work Description (SSWD). Each Ship System Work Description shall be composed of one or more System Work List Items which collectively, describe all work associated with a particular Ship System.

A-4. General Requirements.

A-4.1 Each Ship System Work Description (SSWD) shall be identified by a unique number called a System Work List Item Number (SWLIN). The SWLIN shall be structured as shown on page D-23 and is based on the latest issue of the Ship's Work Breakdown Structure (SWBS). The SWLIN structure shall be included under the SWLIN definition in the Glossary of the SARP.

A-4.2 SWLIN's shall be written to the level of detail required to completely describe what work is to be accomplished. The level of writing shall be appropriate for understanding by a Shipyard Planner. The language used shall be exact in meaning and in accordance with usage common to ship overhauls. Specialized local language shall not be used. Sentences shall be short and concise. Abbreviations shall comply with MIL-STD-12. The SWLIN shall identify by note known interrelated work items covered on separate SWLIN's. The SWLIN shall reference applicable NAVSEA and/or other Customer approved specifications, instructions, letters and messages as required to completely define the work.

A-4.3 SWLIN's shall address required testing and/or certification when specified by competent authority.

A-4.4 SWLIN's shall be printed on either 8 x 10 1/2 inch or 8 1/2 x 11 inch forms and shall include the following as illustrated on pages E-24 and E-25.

HULL NUMBER

SWLIN

SYSTEM

TOTAL SHIPYARD COST: The total SWLIN cost (in dollars) directly chargeable to Customer funds.

JCN (Job Control Number)

EIC (Equipment Identification Code)

TITLE: Alteration Number Title (D, K, F), Maintenance and Repair, OrdAlt Number.

ITEM NO.: For internal Shipyard use (job order identification, etc.)

DESCRIPTION: The paragraphs identifying the alteration or repair work item as per paragraphs A-5 and A-6.

M/D: Total man-day estimate (per line item for repairs).

MATL $ Cost: Dollar cost for material (per line item for repairs).

Costs $: Estimated total "will cost" (material and labor-per line item for repairs).

ASSGMT: Recommended work requirements may be assigned to the Shipyard (SY), Ship's Forces (FA), Tender (TR), Deferred (DEF), and Not Authorized (NA).

PRIORITY	DEFINITION
1	Mandatory repairs to ensure safe and reliable operation of the ship over the ensuing operating cycle between planned regular overhauls.
2	Necessary or desirable repairs not effecting a critical shipboard component/subsystem which should be accomplished to ensure safe and reliable operation of the component/subsystem over the ensuing operating cycle between planned regular overhauls.
3	Minor repairs not effecting the ship safety or equipment reliability which can be deferred for economic reasons.
4	Convenience items

NOTES: See paragraphs A-5 and A-6.

A-4.5 The pages of each SWLIN shall be numbered consecutively and shall indicate the total number of pages, e.g., 1 of 3, 2 of 3, 3 of 3. The pages of each SWLIN which have been changed shall be so annotated with the change numbers.

A-5. Specific Requirements for Maintenance SWLIN's.

NOTE: Pages D-26 and D-27 illustrate a maintenance SWLIN.

A-5.1 Maintenance SWLIN's shall be developed using Pre-Overhaul Test and Inspection (POT & I) results, Ship's Force CSMP, Customer and Shipyard Standard Routine Items, and other sources identifying necessary maintenance work.

A-5.2 Each Maintenance SWLIN shall define all necessary Shipyard and associated Forces Afloat maintenance work to be performed during the overhaul to assure safe and reliable operation of the Ship System involved until the ship's next overhaul.

A-5.3 When a class of overhaul is used to describe the maintenance work to be accomplished, e.g., Class B Overhaul, the class definition shall be in accordance with NAVSEA INST 4790.1, Change 4 of 9 July 1973 (3-M Depot Level Maintenance Reporting; Revised Naval Shipyard Procedures for, 25 June 1970 is the basic instruction).

A-5.3.1 Class B Overhauls shall precisely specify the components to be overhauled and shall define auxiliary or supporting components to be included, (i.e. boundaries of overhaul). Thus, the Class B Overhaul of a generator shall state if the voltage regulator is to be included.

A-5.3.2 Class D Overhauls shall be held to a minimum. A statement shall be included to define the extent of the repairs to be accomplished in conjunction with the "Open and Inspect."

A-5.4 Work requirements shall reference applicable Technical Repair Standards (TRS's), and customer approved specifications, instructions, letters, messages and Repair Work Requirements (RWR's), as required to completely define what work is to be accomplished.

A-5.5 Interfaces with the POT & I Program shall be identified by notes in the appropriate Maintenance SWLIN's.

A-5.7 Maintenance SWLIN's shall include notes, when applicable, to document effects of authorized ShipAlts on Ship Systems.

A-5.8 Maintenance SWLIN's shall address required material when material is to be provided by an activity other than the activity assigned to perform the specified work.

A-5.9 Maintenance SWLIN descriptions shall be organized sequentially as follows:

- POT & I Notes, when required.

- Maintenance Requirements, Recurring Items, etc. in sequential work statements.

- Pertinent notes which clarify or amplify the work statements.

- Testing and/or Certification Requirements, when applicable.

- ShipAlt Notes, when applicable.

A-6 Specific Requirements for Alteration SWLIN's.

A-6.1 Alteration SWLIN's will be developed for each authorized Alteration and OrdAlt. The list of authorized alterations will be based upon information from NAVSEASYSCOM, Type Commander and PERA. The format for alteration SWLIN's shall be in accordance with the samples on pages D-28 through D-30.

A-6.2 The description for alterations should consist of a brief explanation of what the alteration intends to accomplish. See pages D-28 through D-30.

A-6.3 When the accomplishment of the alteration affects other systems, a paragraph which states: "The following systems are affected"; shoul list the appropriate SWBS and a brief statement which indicates the interface of the ShipAlt with the system. See pages D-28 and D-29.

CONTINUATION SHEET

SHIP SYSTEM WORK DESCRIPTION

SYSTEM	SWLIN

ITEM NO	DESCRIPTION	M/D	MATL $	COST $	ASSGMT PRI

SHIP SYSTEM WORK DESCRIPTION

HULL NUMBER DE-1055	SYSTEM SHIP'S SERV. PWR GEN.	JCN	TITLE MAINTENANCE AND REPAIRS
SWLIN 311A01A	TOTAL SHIPYARD COST	EIC	

ITEM NO.	DESCRIPTION	M/D	MATL $	COST $	ASSGMT	PRI
1.	Accomplish repairs to the IB SSTG as follows:	17	$250	$1,953	SY	A
	a. Class B Overhaul (2) ea. Gland Seal Reg.					
	b. Adjust overspeed and range potentiometers.					
2.	Accomplish repairs to the IC SSTG as follows:	17	$250	$1,953	SY	A
	a. Class B Overhaul (2) ea. Gland Seal Reg.					
	b. Adjust overspeed and range potentiometers.					
3.	Accomplish repairs to 1A SSTG as follows:	17	$250	$1,953	SY	A
	a. Class B Overhaul (2) ea. Gland Seal Regulator.					
	b. Adjust overspeed and range potentiometer.					
4.	Replace gasket at base of steam admission valve operator. (JCN EM08-0167)				FA	

SHIP SYSTEM WORK DESCRIPTION

SYSTEM SHIP'S SERV. PWR GEN. | SWLIN 3311A01A (Cont)

ITEM NO	DESCRIPTION	M/D	MATL $	COST $	ASSGMT	PRI
5.	Accomplish Class C Repairs to 750 KW Generator.	49	$300	$5,208	SY	A
	a. Replace Gen Fwd Hi Temp Alarm.					
	b. Cal Voltage and Freq. Meters.					
	c. Clean Pyrometer Sel Sw.					
	d. Clean Slot Temp Sel. Sw.					
	e. Cal Pyrometer.					
	f. Elim oil leaks on governors.					
	g. Elim 2B engine air box drain leaks.					
	h. Repair and cal. Tachometers.					

NOTE: (1) ShipAlt DE1052-800 "Install Vent Fog Precipitators to SSTG" authorized in SWLIN 311D02A "Install New Precipitators".

HULL NUMBER	SYSTEM	JCN	TITLE
DE-1055	SONAR DOMES		S/A DE 1052-24K
SWLIN 165D01A	TOTAL SHIPYARD COST	EIC AF01000	

ITEM NO	DESCRIPTION	M/D	MATL $	COST $	ASSGMT	PRI
1.	Accomplish ShipAlt DE1052-24. Install AN/SQS-26 Rubber Acoustic Window, which replaces the existing HY-80 Steel Sonar Dome Acoustic Window in order to improve sonar performance and to reduce maintenance and repair costs.				SY	A

The following systems are affected:

a. SWBS 124 – An emergency escape hatch from the dome in the diagonal bulkhead will be installed.

b. SWBS 330 – An overhead light, relay operated lantern, and connection box will be installed in Sonar Cable Room and in the new airlock.

c. SWBS 432 – A new "sonar dome repair" sound powered telephone circuit and associated "E" call system will be installed in the Sonar Cable and Access Truck, in the new airlock and at the dome control station. A jackbox will be installed in the dome.

d. SWBS 436 – Pressure alarm panels will be installed in DC Central.

SHIP SYSTEM WORK DESCRIPTION

SYSTEM SONAR DOMES | SWLIN 165D01A (Cont)

ITEM NO	DESCRIPTION	M/D	MATL $	COST $	ASSGNT	PRI
e.	SWBS 437 – A new dome control panel will be installed in Sonar Equipment Room No. 1 and a status panel will be installed in CIC Sonar Control Area.				SY	A
f.	SWBS 463 – The transducer will need to be removed in order to prevent damage while the structural modifieation is being accomplished.					
g.	SWBS 524 – A new salt water pressure redueing station will be installed to support the rubber window when ship is operating.					
h.	SWBS 532 – A fresh water pressure redueing station will be installed to support the rubber window when ship is operating.					
i.	SWBS 551 – An airlock will be installed to per-ment transit from ship into the sonar dome. Air pressurization will be required to support the rubber window and to equalize the pressure between the ship, the airlock, and the sonar dome.					
j.	SWBS 633 – Zine protectors will be installed to prevent galvanic corrosion.					
k.	SWBS 636 – Hull damping and painting will be installed in new and work affected areas.					

SHIP SYSTEM WORK DESCRIPTION

HULL NUMBER	SYSTEM	JCN	TITLE
DEG 4	FIRE CONTROL SYS SWITCHBOARD		ORDALTS TO F.C. SWITCHBOARD OA6754 & 7838
SWLIN 485F02B	TOTAL SHIPYARD COST	EIC 5K00000	

ITEM NO	DESCRIPTION	M/D	MATL $	COST $	ASSGMT	PRI
1.	Accomplish OrdAlt 6754 on UB Switchboard Mk 114.				SY	A
2.	Accomplish OrdAlt 7838, Install TARTAR "D" Switchboard				SY	A

Note 1. O/A 7838 is to be accomplished concurrently with S/A DEG 1-177. Install Digital Tartar, authorized in SWLIN 482D01.

APPENDIX-F

SHIP'S FORCE OVERHAUL MANAGEMENT SYSTEM

(SFOMS)

<u>General System Description</u>

SFOMS is a Management System, designed to assist Ship's Force scheduling and controlling its portion of the overhaul work package. From the standpoint of the ship's involvement, the system is fairly simple. SFOMS revolves around a data file containing ship's workload and manpower data. The ship provides the basic input data and manually maintains or receives back computer sorted reports to provide a better picture of how its manpower resources are being utilized during the overhaul.

No matter what the ship type, whether the overhaul is regular or complex or the overhaul is scheduled at a Naval or Commercial Shipyard, it is to be stressed that SFOMS is merely a tool to be used by the Ship's Force for planning and managing its portion of the overhaul work package. SFOMS does not tell the Ship's Force how to resolve problem areas in the utilization of its available manpower resources. It does provide an identification of problem areas and data which may be used by the Ship's Force to resolve the problem areas.

The activities of SFOMS are divided into three major phases: the pre-overhaul planning phase, the overhaul management phase, and the termination phase. Idealized milestones for implementing SFOMS are given in Tab I.

Prior to the overhaul period, the ship's force should plan for the shift from an operating status to a production status in order to accomplish overhaul objectives. These objectives will be accomplished efficiently by creation of a functional management staff to deal with the special problems inherent in an overhaul. The SFOMS staff differs from the normal operational management organization by the creation of the billet of the Maintenance Manager, who will be responsible for the coordination of the entire overhaul effort. A typical SFOMS staff organization is given in Tab II.

It is recognized that some of the smaller ships may be unable to fill all of the billets described on a full-time basis; one officer may be required to handle several positions, or highly qualified petty officers may be utilized. However, the duties and responsibilities listed should be accomplished by a qualified individual with at least Department Head status if the overhaul is to be a success. The SFOMS staff must also be able to get the cooperation of the various Departments in making changes to the

"data base" (SFOMS Inputs) as these changes occur. This is mandatory in order to continue to produce meaningful management documents.

1. Pre-Overhaul Phase

Although planning for the overhaul should begin at the completion of the last shipyard period, pre-overhaul planning is considered to commence with the designation of the Maintenance Manager.

During this phase, the repair and alteration work packages for ship's force, tender, and shipyard are developed. Thorough inspections of the ship using systematic check-off lists to develop total requirements are accomplished (INSURV and POT & I) followed by generation of the Proposed SARP.

In general, prior to the Work Definition Conference, overhaul work packages for the ship's force, tender, and shipyard are broken down into their elements (key operations and job orders). The manpower, material, technical information, and other resource requirements for each element of work are planned in detail and ordered or reserved. Each work element of the Ship's Force Work Package (SFWP) is scheduled in consonance with the shipyard cardinal event dates (docking, undocking, testing, trials), and an achievable plan of action for the accomplishment of the authorized work package is established in detail.

2. Overhaul Management Phase

Once the overhaul commences, the SFOMS staff will be occupied full-time in supervising, controlling, and administering the overhaul. Even the best planned overhaul will experience difficulties and setbacks, often dictated by events beyond the control of either the ship or the shipyard. Late receipt of material, manpower fluncuations due to unforeseen emergencies, and new emergent work will require changes, often major, in the shipyard's and ship's force schedule. It is, therefore, mandatory that the lines of communications between the ship and shipyard remain open so that all such problems are immediately recognized by all concerned, and the appropriate corrective action can be taken. The SFOMS staff must therefore consult and confer with the shipyard management staff at frequent intervals, often on a daily basis.

3. Termination Phase

This phase commences just prior to conducting the sea trials. It consists of establishing a program for phasing out the SFOMS organization, coordinating ship's force and shipyard plans for conducting the sea trials and identifying and correcting repair discrepancies.

It should be noted that an updated CSMP printout reflecting the close-out of all completed overhaul work (ship's force and shipyard) should be provided by the TYCOM and be distributed to all Departments/Work Centers. Also, new work which cannot be accepted for accomplishment will be deferred in accordance with 3M procedures.

There are several different types of SFOMS, computer and manual, of varying complexity and capability. The criterion for type selection, at present, is normally based on the type of overhaul activity - Naval or commercial shipyard. Evaluation of this criterion in light of general Force characteristics, capabilities, and requirements suggest that the TYCOM would normally designate utilization of a SFOMS whose implementation requirements are minimal yet which provide the ship a degree of management control, which is adequate to ensure an orderly overhaul. Details pertinent to computer and manual types of SFOMS are given in Tabs III and IV.

The SFOMS described in this Appendix is a tool useful to the Ship's Force even though overhaul of the ship is to be accomplished at a Commercial Shipyard. Under these circumstances, since selection of the contractor(s) is usually not made until a few weeks prior to the start of the availability, the interfacing of Ship's Force work with shipyard work is undertaken by the cognizant SUPSHIP activity. As far as the ship is concerned, there is little difference between SFOMS procedures during regular overhaul at a Commercial or Naval Shipyard. Two weeks prior to the commencement of the ship's regular overhaul, SUPSHIP sends a letter to the ship which includes the date of overhaul commencement, tentative key event dates to guide the ship in scheduling their SFWP, and other basic information useful to the ship, usually in the form of an information manual.

Purpose

The level of accomplishment of ship's force work during an overhaul has a significant impact on the ship's operational readiness at overhaul completion. SFOMS was designed as an overhaul management system to aid in the most effective utilization of a ship's resources of manpower and time to assure that on completion of overhaul all necessary work has been completed for the ship to accomplish its mission.

SFOMS provides a capability for making a smooth transition from an operating environment to an industrial maintenance environment. To accomplish the goal of increased material readiness through a more effective and thorough overhaul, SFOMS provides:

1. Ship's force and TYCOM managers with advance information to enable them to effectively distribute the workload of the predicted repair package among ship's force, shipyard, and tender manpower to fully and effectively utilize ship's force personnel to accomplish repair and maintenance tasks. Management decisions in this regard are based on ship's force capability, capacity, and stability.

2. Proper work definition (skill level and time requirements) to develop a systematic plan to accomplish ship's force work and required logistic support in a time frame consistent with the shipyard schedule.

3. Reports, manually or computer produced, which Work Center Supervisors, Division Officers, Department Heads, and the Commanding Officer can use to program, schedule, predict, and effectively manage all ship's force work.

Responsibilities

To assemble and implement a SFOMS, responsibilities may include, but are not limited to, the following:

1. Type Commander -

   a. Direct utilization of a particular type of SFOMS.

   b. Initiate Automated Work Request Program.

2. PERA(CRUDES) -

   a. Conduct shipboard SFOMS briefings and training.

   b. Install SFOMS Computer Program (when tasked).

   c. Assist ship in System utilization during first week of overhaul.

3. Overhaul Yard -

   a. Provide

      (1) Key event and/or milestone schedules to ship.

      (2) Facilities for the Ship's Force Overhaul Center.

b. If tasked, provide

(1) Scheduling and progressing support for ship's force/shipyard interface work.

(2) Review, annotation, and return to ship of Ship's Force Work Package (SFWP).

(3) Ordering, progressing, and warehouse support of Ship's Force overhaul material requirements.

(4) Ship's Force Material Reports for status of obligated and expended funds.

(5) Integration of Ship's Force work into Shipyard MIS System.

4. Ship

a. Activate a temporary SFOMS staff to implement SFOMS.

b. Assume responsibility for work items designated as Ship's Force at the Work Definition Conference.

c. Accomplish detailed job planning and complete 4790/2K series forms for Ship's Force work (scope and Key Op).

d. Schedule Ship's Force work around the Overhaul Yard's key event/milestone schedules.

e. Order Long Lead Time Material for Ship's Force work.

f. Identify additional deferral items requiring industrial assistance for Type Commander approval.

g. Assign priorities for planned maintenance using established 3-M guidelines.

Examples

The special SFOMS staff is formed and integrated within the framework of the Ship's departmental organization to manage and coordinate the Ship's Force portion of the overhaul. Representative organizations and functions are given in Tab II. Even though ship size precludes filling all suggested billets, the functions should be reviewed to ensure that all will be performed.

In addition to the formation of a functional SFOMS management staff (Tab II) and establishment of overhaul planning milestones for development and execution of the SFWP (Tab I), certain other actions must be taken. For example:

1. Ship's Force manpower resources for the overhaul period must be identified and documented to provide a baseline against which a work load may be planned and scheduled.

2. Ship's Force non-industrial manpower requirements for the overhaul period must be identified and documented.

3. Ship's Force manpower available for direct labor during the overhaul period must be identified.

4. Ship's Force industrial type work must be identified and scheduled for accomplishment.

5. Management reports for progressing scheduled work and identifying problem areas are generated and updated throughout the overhaul period.

Accomplishment of these actions are detailed in Tabs III and IV.

TAB I

SFOMS MILESTONES

ACTION	ACTION TITLE	SHIP	TYCOM	PERA	YARD
		ACTION ACTIVITY			
1	Direct ship to implement SFOMS during ROH.		X		
2	Conduct pre-deployment briefing on SFOMS.			X	
3	Direct ship to implement and identify all work centers by code based on latest TYCOM instructions.			X	
4	Forward SFOMS instructions, manuals, etc., to ship.			X	
5	Forward tasking letter to overhauling shipyard requesting support for the SFOMS.			X	
6	Assign key SFOMS staff (Maintenance Mgr. and SFOMS Coordinator).	X			
7	Review ship's CSMP for completeness and accuracy.	X			
8	Conduct Work Definition Conference.		X		
9	Update CSMP to reflect Work Definition Conference decisions.	X			
10	Allocate and authorize funds for procurement of ship's force material under the SFOMS.		X		
11	Publish ship's force work center codes based on latest TYCOM instructions.	X			
12	Forward or provide Key Event Date Listing to ship and PERA.				X
13	Computer generate automated 4790/2K SFOMS Input Forms and forward to ship.		X		
14	Distribute 4790/2K SFOMS Input Forms to applicable work centers.	X			

ACTION	ACTION ITEMS	ACTIVITY ACTION SHIP	TYCOM	PERA	YARD
15	Conduct SFOMS training (1st phase).			X	
16	Establish and publish material ordering procedures for work centers in consonance with instructions from overhauling activity.	X			
17	Assign remaining SFOMS staff.	X			
18	Define and publish lines of authority and delegate responsibilities of SFOMS personnel.	X			
19	Designate and publish time and place to pick up and turn in SFOMS documents.	X			
20	Designate authority for certification of SFOMS documents.	X			
21	Prepare Manpower Budget.	X			
22	Scope and schedule Key Ops.	X			
23	Order Material.	X			
24	Forward SFOMS documents to shipyard for ADP.	X			
25	Establish normal work day for ship's force during overhaul.	X			
26	Publish responsibilities of Quality Assurance Division.	X			
27	Establish tool control procedures and provide tool requirements to shipyard.	X			
28	Establish Ship's Force Overhaul Management Center.	X			
29	Complete Industrial Activity Data of the 4790/2K SFOMS Forms and forward SFOMS documents to Data Processing Office for processing				X
30	Provide listing of "ship-to-shop" items and material handling control procedures				X

ACTION	ACTION ITEMS	ACTION ACTIVITY SHIP	TYCOM	PERA	YARD
31	Provide production shop workload forecast to ship and PERA. Shop 26 Manning Curves are required by ship to establish Fire Watch Division for ROH.				X
32	Provide listing of shipyard training courses and spaces available during ship's availability.				X
33	Provide instructions and forms covering loan of shipyard tools to ship.				X
34	Establish control procedures for "ship-to-shop" or "tender repair" items.	X			
35	Forward "tender work" requests.	X			
36	Assign nonsupervisory personnel to new SFOMS Work Centers.	X			
37	Establish problem status reporting procedures and staff responsibilities.	X			
38	Designate and publish standard work week.	X			
39	Develop financial management procedures for controlling material and ASF funds.	X			
40	Publish list of names and phone numbers of Division Officers and ROH Coordinators.	X			
41	Conduct SFOMS training (2nd phase).			X	
42	Balance SFWP workload.	X			
43	Establish Ship's Force Overhaul Management Center.	X			
44	Select centralized location for Ship's Force Overhaul Management Center.	X			

TAB II

ORGANIZATION AND RESPONSIBILITIES

ORGANIZATION. The need for greater production and higher quality in repairing and overhauling ships requires an organization that can make the best use of men, skills, and materials. To help the ship meet this requirement, a special management staff is formed to accomplish necessary functions to assist in the management and control of an availability. A typical SFOMS organization for large ships is depicted in Figure I . If a ship's manning does not provide the depth necessary to staff the organization, staff positions may be combined to ensure that the staff functions applicable to the specific availability (regular or restricted) are performed. The primary concern is the performance of applicable functions rather than the specific structure of the organization. This is particularly true for small ships which must often combine functions. Nevertheless, it is vital that organizational responsibilities and delegation of authority be clear to all participants in the SFOMS program. A typical combination of functions by a small staff is offered as an example in Figure 2.

ORGANIZATION FUNCTIONS

Activation of the SFOMS organization adds special tasks to the basic shipboard organization. The authority and responsibilities of the Commanding Officer, Executive Officer, Department Heads, and Division Officers are as prescribed in Navy Regulations.

Through the Executive Officer, the Commanding Officer directs the functioning of all ship's force maintenance activities in a manner that will assure the proper balance between shipyard and ship's force assigned work. The SFOMS organization performs a staff function for the Executive Officer to facilitate the management of ship's force work so that it complements that of the shipyard and ensures the successful accomplishment of the ship's availability. It is recognized that some ships may be unable to fill all of the billets (applicable to the specific availability), described in subsequent paragraphs, on a full-time basis. Some typical functions as described in this chapter have been usefully performed by SFOMS staff personnel during previous availabilities. An officer or qualified petty officers may be required to perform several functions from those outlined in the organizational SFOMS job descriptions described in subsequent paragraphs.

The Executive Officer appoints the SFOMS staff. For efficiency and program continuity, staff changes should be minimized. A Maint-

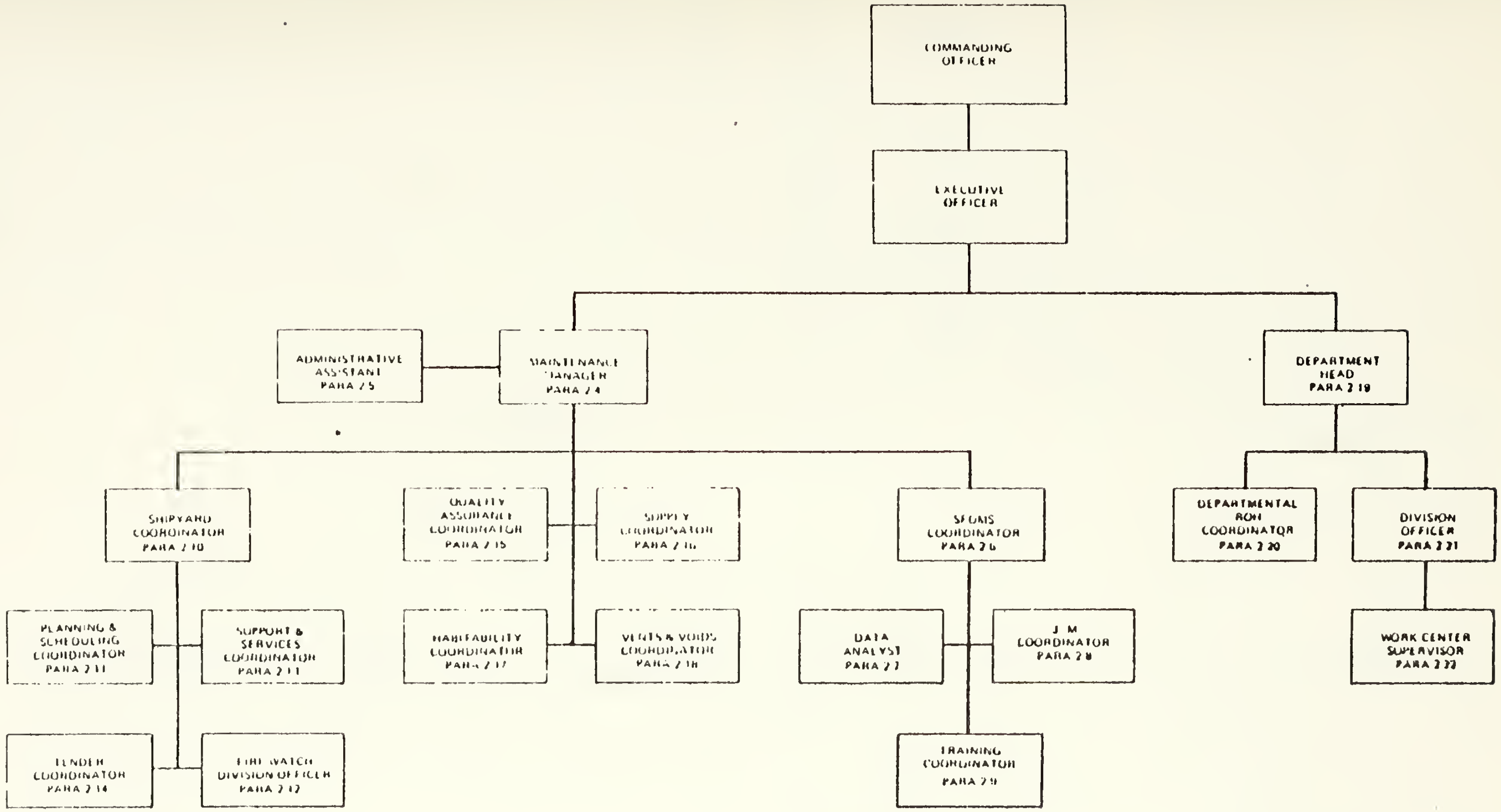


FIGURE F-1 TYPICAL SFOMS ORGANIZATION — LARGE SHIP

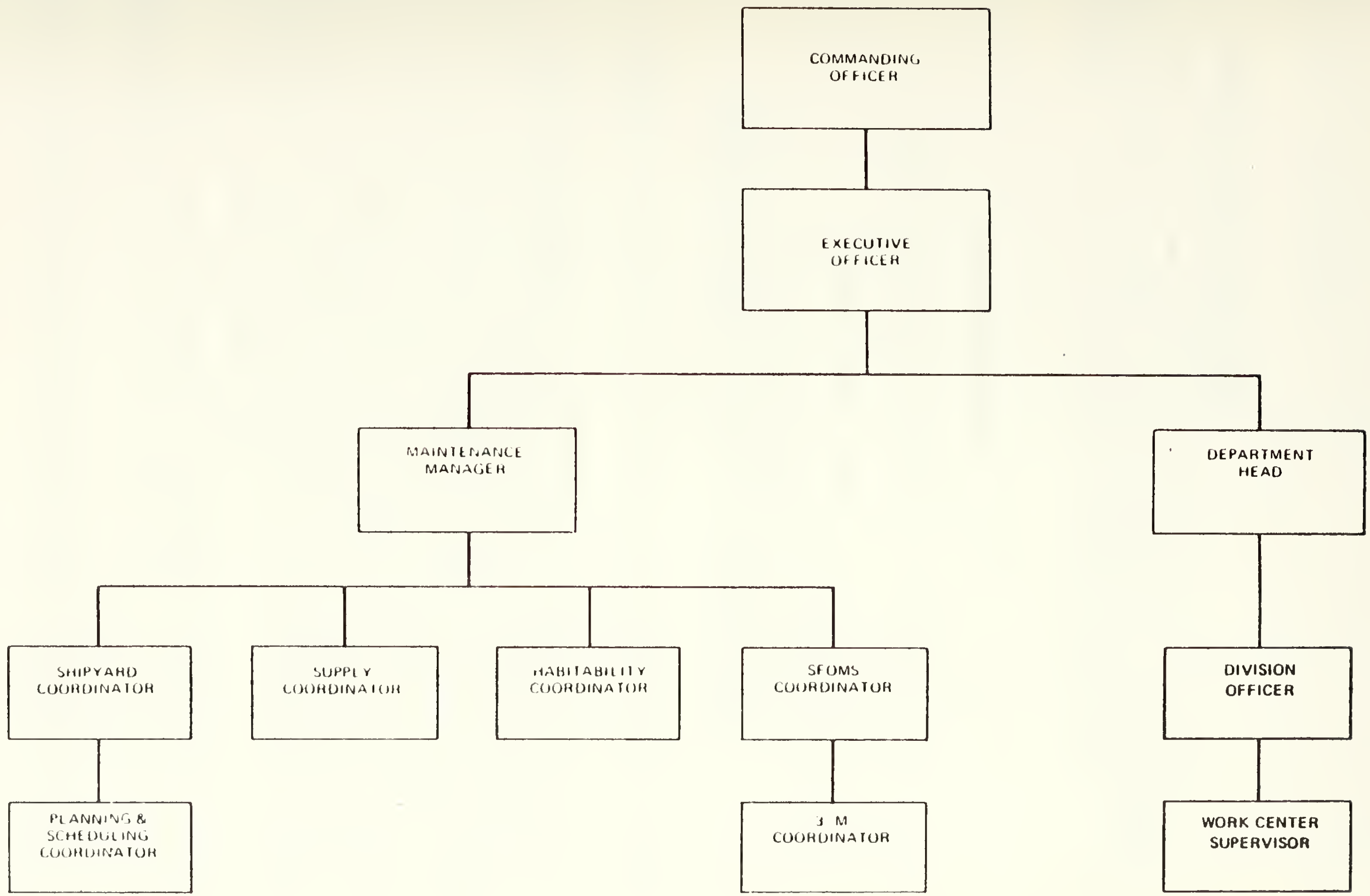


FIGURE F-1 TYPICAL SFOMS ORGANIZATION – SMALL SHIP

enance Manager heads the SFOMS staff and is responsible to the Executive Officer for the supervision and management of the SFOMS organization. On small ships, in particular, the Maintenance Manager must review the total range of functions to be performed and assign to the SFOMS staff those duties appropriate to the specific availability and to the type and class of ship involved.

MANAGEMENT RESPONSIBILITIES.

Each level of management is assigned certain responsibilities which must be exercised if SFOMS is to be a dynamic tool. Every manager, regardless of his position, must take initiative and follow through in accordance with the following general managerial principles:

1. Define objectives.

2. Plan for their achievement.

3. Organize and distribute resources as required to accomplish the plan.

4. Appraise and control the execution of the plan.

5. Redirect effort and resources as necessary to achieve all objectives. Regardless of assigned responsibilities, all levels of management must support the SFOMS Program.

Subsequent paragraphs describe the staff positions of the SFOMS organization.

MAINTENANCE MANAGER. The Maintenance Manager supervises and manages the ship's overhaul/repair efforts. A senior officer with a background in industrial management or previous shipyard experience would be desirable. It is recommended that the Maintenance Manager be other than the Engineering Department Head. The Maintenance Manager provides direction and guidance for the SFOMS staff and advises the Executive Officer in all pertinent matters. He interprets and implements the procedures contained in SFOMS manuals and the maintenance policies of higher authority. He is expected to use all available resources to plan, schedule, and control ship's force work and monitor shipyard work. During the availability, the SFOMS staff functions as a department. The Maintenance Manager serves as the SFOMS Department Head. The Maintenance Manager shall:

1. Plan, develop, publish, and implement maintenance policies and procedures for administration, supervision, and operation of the SFOMS organization.

2. Schedule and control all ship's force maintenance, ensuring maximum utilization of ship's personnel through advanced planning.

Maintain records to provide current information essential to the planning and management of the SFWP. Advise Department Heads of any changes in the shipyard schedule that may affect their department. Arrange periodic meetings with Department Heads, Division Officers, and appropriate staff members to discuss identified problems, interfaces, and potential problem areas.

3. Develop shipyard job closeout procedures for accepting shipyard accomplished work.

4. Use the Quality Assurance Coordinator, if designated, to implement the quality assurance program.

5. Initiate action to eliminate problems that may prevent the overhauling activity from completing its work with a minimum of delay or interference. In this respect, he acts as a representative of the Commanding Officer to shipyard supervisory personnel.

6. Advise the Executive Officer on all elements of the availability, including shipyard progress, ship's force progress, manpower utilization, housekeeping requirements, potential problem areas, intraship personnel transfer, shipyard and ship's force prognosis, and recommendations for correcting lack-of-resource problems.

7. Prepare for submission a situation report (SITREP) to the Type Commander in accordance with existing instructions.

8. Review and forward all requests for new ship accomplish work to the Type Commander through the shipyard Ship Management Officer or Type Desk Officer and assure that appropriate steps are taken upon receipt of the Type Commander's action.

9. Give final approval action for all ASF (Assist Ship's Force) work requests and maintain funds control.

10. Prepare and issue, for the Commanding Officer, a comprehensive SFOMS Evaluation Report upon completion of the ship's availability.

ADMINISTRATIVE ASSISTANT. During the availability the SFOMS staff functions as a department. The Maintenance Manager serves as the Department Head. On large ships or in complex overhauls an Administrative Assistant may be assigned to assist the Maintenance Manager in departmental matters so that the Maintenance Manager's primary efforts are directed towards management of the availability. The Administrative Assistant reports to the Maintenance Manager and shall:

1. Perform departmental administrative functions including personnel accounting, supervision of clerical personnel, and special projects management.

2. Assist the SFOMS staff during periods of peak loads, leaves, or absence.

SFOMS COORDINATOR. The SFOMS Coordinator must be thoroughly versed in every aspect of SFOMS and prior experience in production planning and control concepts would be desirable. He is the production manager of the SFOMS organization and is responsible for ensuring that all maintenance activities and personnel efforts are coordinated to achieve the ship's availability as scheduled in the SFWP. The SFOMS Coordinator is responsible for the collection of system input and the analysis of SFOMS reports. The analysis will identify areas where the control of resources is necessary for the most efficient operation of the organization and ensure adherence to the SFWP schedule. He is assisted by the Data Analyst, 3-M Coordinator, and Training Coordinator. He reports to the Maintenance Manager and shall:

1. Supervise the Data Analyst, 3-M Coordinator, and Training Coordinator.

2. Assist the Department Heads and Division Officers in preparing and interfacing the SFWP.

3. Work with the Planning and Scheduling Coordinator to coordinate ship's force/shipyard related work.

4. Coordinate division jobs that require work performance by, or support from, a work center other than the originating work center, i.e., AWC (Accomplishing Work Center).

5. Maintain and supervise a central data center for collection, analysis, and graphic display of information pertinent to the SFOMS program. All information concerning ship's force work, ship's force assist work, ship-to-shop work, and shipyard schedules will be available in this center. (Shipyard schedules are maintained by the Planning and Scheduling Coordinator.)

6. Assist Department Heads and Division Officers in analyzing computer reports.

DATA ANALYST. To assist in the control of the availability, it is necessary that certain data be collected and made available for ready use. This service is performed by the Data Analyst. Prior experience in the analysis and presentation of computer data is desirable. The Data Analyst prepares tables, charts, and graphs which depict the overhaul/repair progress and manhour expenditures and provides the performance and statistical information required to direct the availability operations. A basic requirement for these presentations is the acquisition of accurate information on the availability and use of ship's personnel. Personnel assignments are determined and compared with requirements. Absentee factors are computed to permit forecasting of manpower availability. Absences are studied to determine and eliminate undesirable causes. Information obtained on accomplishments and expenditures in each maintenance activity provides a measure of the efficiency of the availability while manpower information provides the basis for readjusting the SFWP. The Data Analyst reports to the SFOMS Coordinator and shall:

1. Ensure that data collected is correct, accurate, and sufficient for the needs of the SFOMS program.

2. Screen new ship's force work requests received from the Planning and Scheduling Coordinator for completeness prior to forwarding to the Data Services.

3. Collect all inputs and batch them according to function before submission to the Data Services and maintain a count of all input documents.

4. Distribute processed reports to the departments after verification of their accuracy.

5. Analyze SFOMS reports.

6. Identify additional SFOMS data processing requirements.

7. Assist the SFOMS Coordinator in maintaining status display boards by collecting the data necessary to measure the efficiency of the maintenance organization, and maintaining those charts, graphs, and tables required for analysis.

8. Monitor the availability and use of ship's personnel.

9. Prepare a weekly brief on the status of ship's force work for presentation to the Commanding Officer. This includes industrial and operational (if applicable) manhour expenditures and other appropriate information pertinent to the ship's availability progress.

10. Maintain SFOMS reports and correspondence files.

3-M COORDINATOR. The 3-M Coordinator position is filled by the ship's 3-M Officer. He is responsible for coordinating and supervising all facets of the ship's 3-M program as outlined in the 3-M Manual (OPNAVINST 4790.4). He is the principal advisor to the SFOMS Coordinator on the CSMP and 3-M System concepts. He ensures that scheduled PMS (Planned Maintenance Subsystem) requirements are accomplished so that the ship will have a high degree of material readiness upon completion of the availability. The 3-M Coordinator reports to the SFOMS Coordinator and shall:

1. Advise the Maintenance Manager and SFOMS Coordinator during the SFOMS Pre-Overhaul Phase on the status of the work package preparation, problems encountered, and recommendations for solving these problems.

2. Assist Department Heads and Division Officers in identifying planned maintenance requirements to establish a PMS package.

3. Ensure that the planned maintenance requirements are being properly accomplished and that records are currently maintained and updated throughout the availability.

4. Ensure prompt receipt of all new and completed 3-M System documents so that the CSMP is maintained and updated throughout the availability.

5. Ascertain that completed maintenance actions are reported on a deferred copy of OPNAV Form 4790.2K.

TRAINING COORDINATOR. In preparing for the availability, the Training Coordinator must become thoroughly versed in the SFOMS so that he can carry on the indoctrination and training program introduced and supplied by the TYCOM, through his designated representative, i.e. PERA, contractor, etc. Prior experience in preparing and conducting training programs is desirable. He reports to the SFOMS Coordinator and shall:

1. Determine and recommend to the SFOMS Coordinator an acceptable level of SFOMS training for all ship's personnel.

2. Conduct personnel training until all are adequately trained, as indicated by the quality of SFOMS reporting. Coordination with the Data Analyst will help identify specific training needs or program deficiencies.

3. Train new assignees to the ship's force on the SFOMS concept and reporting and recording procedures.

4. Maintain adequate training records and files to reflect the level of SFOMS training provided and identification of personnel who have had SFOMS training.

5. Arrange for adequate space and facilities to meet SFOMS training needs.

6. Supply, during the planning stage, any data concerning quotas for formal off-ship schooling.

SHIPYARD COORDINATOR. To ensure an effective interface, the Shipyard Coordinator is the primary contact between the ship and shipyard in all matters relating to planning and scheduling, fire watch, shipyard support and services, and tender support. Prior experience in ship/shipyard production control and scheduling techniques is desirable. An Engineering Officer has the background to fill this billet. His major management tools are the shipyard schedules, progress meetings, and SFOMS computer reports. Successful completion of the SFWP is dependent upon adherence to the SFWP schedule. In this respect, liaison with the shipyard Ship Superintendent is extremely important to the success of the SFOMS, since it is here that the interface between

1. Supervise the Support and Services Coordinator, IMA Coordinator, Planning and Scheduling Coordinator, and the Fire Watch Division Officer.

2. Resolve problems concerning shipyard and/or IMA interface.

3. Review approved ASF work and coordinate work requirements with shipyard shops and/or codes.

4. Maintain liaison with Department Heads concerning ship/shipyard and IMA interface progress, schedules, and potential problem areas.

5. Satisfy the ship's overhaul support and service requirements through the Support and Services Coordinator.

6. Maintain adequate fire prevention measures during the availability through the Fire Watch Division Officer.

7. Ensure that the ship's IMA requirements are properly scheduled and accomplished in consonance with the shipyard's and ship's force work through the IMA Coordinator.

8. Maintain availability progress status to ensure effective utilization of shipyard and IMA capabilities in support of the ship's force through the Planning and Scheduling Coordinator.

PLANNING AND SCHEDULING COORDINATOR. During the Pre-Overhaul Phase, the Planning and Scheduling Coordinator participates in generation of the SFWP. Throughout the availability, he is responsible for maintaining an accurate and current plan reflecting scheduled work for the availability. Prior experience in production planning and scheduling concepts and knowledge of shipyard procedures are desirable. Under the direction of the Shipyard Coordinator, he works in conjunction with other members of the SFOMS staff, department, and shipyard personnel to ensure that ship work schedules remain realistic and compatible with shipyard key event schedules. Through the Shipyard Coordinator, he keeps the shipyard advised of ship's force progress on interface work. Responsibilities assigned to the Planning and Scheduling Coordinator are to:

1. Assist in development of the SFWP.

2. Provide Division Officers, in coordination with the Departments, recommendations and pertinent information relative to scheduling and rescheduling.

3. Coordinate the maintenance of status display boards and graphs pertaining to shipyard schedules with the SFOMS Coordinator.

4. Provide shipyard scheduling information to the Shipyard Coordinator for all approved ASF work.

5. Receive and ascertain that an approved new ship's force accomplish work request is acceptable for scheduling compatibility. Request is then forwarded to the Data Analyst for inclusion in the SFWP.

6. Schedule all ship-to-shop work in consonance with the shipyard schedule.

7. Analyze SFOMS attention required (i.e., Key Op) actions for adverse effects on ship and shipyard schedules.

8. Evaluate effects of proposed scheduling changes on the ship's force workload and develop alternatives when work cannot be accomplished or will interfere with other events already scheduled.

9. Obtain information on ship/shipyard interface work by coordinating with shipyard personnel to determine whether the ship's force can accomplish the work as scheduled or if rescheduling is necessary.

10. Approve final scheduling on all ship's force work.

11. Maintain close liaison with the Fire Watch Division Officer to ascertain that adequate fire watch support is being provided to the shipyard.

FIRE WATCH DIVISION OFFICER. The Fire Watch Division Officer reports to the Shipyard Coordinator. During the availability, a Fire Watch Division is organized under his supervision. Department Heads provide permanently assigned personnel to the Fire Watch Division for the entire availability. The Fire Watch Division Officer's primary responsibility is to provide fire watch services for the shipyard welders or burners. To accomplish this function, he manages and supervises the division in a manner consistent with the policies established by the Maintenance Manager. The Fire Watch Division Officer must be familiar with the ship's configuration and have a working knowledge of fire fighting techniques. To fulfill his responsibilities, he must maintain close liaison with the Planning and Scheduling Coordinator so that he will be aware of the ship's force and shipyard scheduled events requiring fire watch support. He shall:

1. Instruct Fire Watch Division personnel in the use of available firefighting equipment, types of fires that may occur, and firefighting techniques to be employed.

2. Maintain a current status report of inoperable equipment in the firefighting system and arrange with the shipyard to provide additional firefighting equipment as required.

3. Maintain a fire watch log reflecting the location of the burning or welding operations and the name of the fire watch assigned. Upon completion of each assignment, the fire watch reports actual time expended on the job.

4. Establish and maintain liaison with the shipyard supervisory personnel involved in fire prevention practices or procedures.

5. Prepare instructions (standard operating procedures) for managing the division during the availability, reporting fires, standing night fire watch, ensuring adequacy and servicing of fire-fighting equipment issued to the division, and maintaining the fire watch log.

SUPPORT AND SERVICES COORDINATOR. The Support and Services Coordinator reports to the Shipyard Coordinator and is the primary contact for all support and services extended by the shipyard. Through departmental coordination, he identifies the specific ship's force requirements in terms of type and quantity of ship's resources. Once the required services have been established, they will become self-sustaining and require only periodic monitoring to ensure continued adequacy. His main concern will involve the process of supplementing the ship's force capabilities with additional tools from the shipyard and the implementation and maintenance of procedures for accounting for these items. His responsibilities include, but are not limited to, the following:

1. Supervise all temporary storage and laydown areas assigned to the ship.

2. Arrange schedules to meet departmental requirements for automotive equipment, cranes, floating derricks, barges, material-handling equipment, and other shipyard support.

3. Arrange with the departments for delivery and pickup of all ship-to-shop work.

4. Comply with shipyard waterfront regulations concerning cleanliness of piers alongside the ship and watch requirements.

5. Maintain liaison with shipyard personnel in removal of materials from the pier and the ship (including scrap).

6. Take action on problems identified as his responsibility.

7. Develop procedures with the shipyard for obtaining and accounting for tools loaned to the ship by the shipyard.

8. Develop procedures with the shipyard for obtaining fire extinguishers and safety helmets and fire extinguisher support services.

IMA COORDINATOR. The IMA Coordinator reports to the Shipyard Coordinator for all matters concerning work requiring removal of equipment from the ship and delivery to a repair activity other than the shipyard to minimize work stoppages and manpower losses due to uncoordinated actions. In liaison with the Departments, he determines the number and types of maintenance jobs (on and off ship) that are to be performed by activities such as tender, FMAG, DATC, etc. He also ascertains, when applicable, the availability of materials. The effective use of the outside activity's support capabilities depends entirely on the ability of the IMA Coordinator to identify and accurately schedule the ship's requirements. He shall:

1. Coordinate all ship's force off-ship requirements with the assigned repair activity to accomplish a parallel repair effort.

2. Advise the departments on the progress of off-ship jobs and provide feedback information.

3. Work with the Planning and Scheduling Coordinator to ensure that the ship's force, shipyard, and outside repair activity work schedules are compatible.

4. Establish transportation requirements and schedules to ensure delivery of equipment to be overhauled/repaired in accordance with the outside repair activity schedule.

QUALITY ASSURANCE COORDINATOR. The Quality Assurance Coordinator reports to the Maintenance Manager and is responsible for quality assurance matters. Prior experience in quality control/quality assurance concepts would be most desirable. The procedures for accomplishing the quality assurance objectives are detailed in the SFOMS Quality Assurance Inspection Manual. His specific responsibilities are to:

1. Perform quality assurance inspections necessary to certify satisfactory completion of work items and furnishing discrepancy reports to the Maintenance Manager and the applicable Department Heads when an unsatisfactory condition exists.

2. Prepare instructions and check-off sheets to ensure that applicable work standards, calibration procedures, and specified materials are used in performance of the work.

3. Arrange for necessary quality assurance training from the shipyard for the Quality Assurance Inspectors.

4. Witness, with the Department representative, required inspections and tests conducted by the ship's force or the shipyard.

5. Record satisfactory completion of required quality inspections and tests; ascertain that maintenance actions are satisfactorily accomplished; and ensure that the equipment is ready and capable of performing its designed function.

6. Establish coordination with the shipyard Quality Assurance Office for inspection of work items that are beyond the ability of the ship's Quality Assurance Division staff; for example, x-raying of welds on high pressure equipment and calibrating high pressure gauges.

7. Maintain pertinent records of all test and inspection results.

8. Maintain coordination with the Work Center Supervisors to provide direct communications regarding scheduling of tests and inspections and provide assistance in the solution of maintenance problems when requested.

9. Conduct additional surveys, when required, to provide the Maintenance Manager with trends depicting the quality of maintenance performed and conformance to established procedures.

SUPPLY COORDINATOR. The Supply Coordinator reports to the Maintenance Manager. He will be designated by the ship's Supply Officer and will act in the name of the Maintenance Manager to eliminate logistic conditions that could adversely affect the ship's availability. To accomplish this, the Supply Coordinator assists the ship's maintenance activities in establishing supply needs as far in advance of requirements as practicable. His efforts must be directed to ensure that material is available when and where required. He is responsible for requisitioning, controlling, and receiving all material or repair parts required to support the SFWP. He is advisor to the ship's force on the specific procedures to be used to identify and requisition material for the SFWP. He receives the Overhauling Activity or Naval Supply System (whichever is applicable) material status listings and inputs pertinent status information to the SFOMS Master File. Among the responsibilities and duties assigned to the Supply Coordinator, the following are of primary importance:

1. Ensure that an adequate staff is assigned to support the SFWP material requirements.

2. Effectively monitor the applicable shipyard, ship and supply activity functions (i.e., procurement and delivery of material) that support the ship.

3. Coordinate and control the procurement, receipt, storage, movement, and issuance of ship's force material.

4. Maintain a file of all material requisitions.

5. Advise the ship's force on sources of material when not obtainable through normal channels and assist in locating and obtaining such material.

6. Take action on items reported as supply problems by the SFOMS staff, Division Officers, or those identified in SFOMS output records.

7. Verify the completeness of all ship's force requisitions for repair parts and material.

8. Ensure that all ship or shipyard document numbers are cross-filed to the ship's force JCNs.

9. Ensure that all material status reports received from the applicable supply activity are reflected in the SFOMS Material Status Report.

10. Perform liaison with the applicable supply activity representative to ensure timely and continuous follow-up on outstanding material. Particular emphasis must be placed upon material that has an anticipated delivery date later than the required date.

11. Monitor and stage material received within the shipyard to ensure its location and delivery to the ship.

12. Establish fund control procedures for ship's force material.

13. Maintain close liaison with the Supply Overhaul Assistance Program (SOAP) Team to ensure necessary ship participation to attain an effective Supply Overhaul.

HABITABILITY COORDINATOR. The Habitability Coordinator reports to the Maintenance Manager and is responsible for providing suitable berthing, messing, and head facilities within the ship/shipyard during the availability. In addition, he is responsible for the management and supervision of the Habitability Division. Close coordination between the Habitability Coordinator and Department Heads is essential to ensure that officers and enlisted personnel are afforded acceptable living conditions throughout the availability. He advises the SFOMS staff and appropriate department supervisors of the specific dates that changes in berthing or messing compartments are required. Additionally, he advises the SFOMS staff of habitability improvement items that require command attention. To accomplish habitability objectives, he must review all shipwide-oriented job orders to identify those berthing or messing compartments that will be affected due to ripout, high noise levels resulting from chipping or grinding, extraordinary traffic, exposure to weather, or affected by loss of heat, electricity, water, or air-conditioning. He shall:

1. Provide suitable berthing, messing, and head facilities within the ship that are not in conflict with shipyard or ship's force work.

2. Advise the departments of specific dates that changes in berthing or messing compartments must be made.

3. Advise the Maintenance Manager of all habitability items that require command attention.

4. Monitor shipyard work and drawings to ensure that all aspects of habitability have been considered.

5. Supervise the accomplishment of habitability work in accordance with the established SFWP.

6. Establish procedures to ensure that adequate housekeeping standards are maintained.

VENTS AND VOIDS COORDINATOR. The Vents and Voids Coordinator reports to the Maintenance Manager. He supervises the Vents and Voids Division which is organized to clean and repair vent ducts, fan rooms, and voids. Due to the nature of this work, he must maintain close liaison with the Planning and Scheduling Coordinator to ensure that his efforts do not negate any other job accomplishments. In addition, coordination with the Habitability Coordinator will preclude conflicts involving berthing, messing, or head facilities. Assignments to this division should include some personnel from one of the existing Damage Control Work Centers. These personnel are familiar with the ship's configuration, the procedures for opening and draining voids, and the safety requirements for entering voids. The Vents and Voids Coordinator's specific responsibilities are:

1. Clean and repair vent ducts and fan rooms on the ship.

2. Open, inspect, clean, and paint all voids on the ship.

3. Advise the Maintenance Manager of any problems in the Vents and Voids Division that require command action.

DEPARTMENT HEAD. Each Department Head remains responsible for the management of his department while fulfilling SFOMS functions. However, the Executive Officer has delegated the necessary authority to the Maintenance Manager to direct and supervise the ship's total availability program. Therefore, it is extremely important that a relationship of mutual coordination and cooperation be established and maintained between the Maintenance Manager and the Department Heads who must work together on major phases of the ship's availability. It is essential that the Maintenance Manager be recognized as the inter-departmental coordinator/manager. Division Officers, Work Center Supervisors, and where appointed, the Departmental ROH (Regular Overhaul) Coordinator are responsible to and work for the Department Head. It is expected that the Department Head normally will delegate to the Departmental ROH Coordinator the liaison of routine instructions and directives between the SFOMS staff and the Division Officers. Such a policy will

expedite SFOMS efforts. On some routine maintenance matters it may be most advantageous for the Department Heads to permit his maintenance supervisors to work directly with the SFOMS staff. However, it is usual for a Department Head to reserve to himself any maintenance decisions that substantially affect his department. The Department Head must:

1. Meet with his Departmental ROH Coordinator, Division Officers and Work Center Supervisors to ensure that available resources are adequate and assist them in all aspects of SFOMS.

2. Meet with the Commanding Officer, Maintenance Manager, and/or his staff, as required, to discuss personnel utilization, problem areas, and job progress.

3. Ensure that ship's force work items are completed as scheduled. Particular emphasis must be placed upon jobs having a shipyard interface or dependency.

4. In the absence of a designated Quality Assurance Coordinator, assume full performance of quality assurance functions for SFOMS work within his respective departments.

5. Approve or disapprove all new (not previously authorized) ship's force work prior to forwarding it to the Planning and Scheduling Coordinator for action.

6. Approve or disapprove all new (not previously authorized) shipyard work prior to forwarding it to the Planning and Scheduling Coordinator.

DEPARTMENTAL ROH COORDINATOR. On large ships and for complex overhauls a Departmental ROH Coordinator may be designated to perform liaison between the department and the SFOMS staff; and to assist the Department Head in the management of the SFOMS and 3-M Systems within the department. The Departmental ROH Coordinator reports to the Department Head. Maximum use of the Departmental ROH Coordinator will expedite routine communications between the Department and the SFOMS staff, thereby permitting the department supervisors to concentrate on production. The Departmental ROH Coordinator's function is to coordinate the daily progress of jobs scheduled to begin or be completed during the week. He reports to the SFOMS staff on all new work requirements, job cancellations, or any other deviations from the scheduled plan. Among his delegated responsibilities are to:

1. Provide the SFOMS Coordinator, upon request, with ship's force job status information.

2. Assist Division Officers and Work Center Supervisors in the interpretation of SFOMS Output Reports.

3. Provide Division Officers and Work Center Supervisors with feedback information from the SFOMS staff.

4. Provide the Shipyard Coordinator, upon request, with ship's force/shipyard interface job status information.

DIVISION OFFICER. The Division Officer is responsible for complete line management of all work centers within his division including data collection, job planning, job scheduling, job manning, accuracy of data reported, analysis of management documentation, and monitoring of shipyard work within his division. During the Pre-Overhaul Phase, the Division Officer, in conjunction with his Work Center Supervisors, prepares the division's portion of the SFWP. He also assists his Department Head in the preparation of the department's work package. The Division Officer, in accomplishing his duties, shall:

1. Monitor alterations and repairs scheduled to be accomplished by the ship's force within his division during the availability and submit requests for all new (not previously authorized) ship's force and/or shipyard work to the Department Head for his approval and action.

2. Ensure that Work Center Supervisors are advised of schedules within the division and which jobs will be accomplished by the shipyard and by the ship's force.

3. Reschedule jobs, as required, to maintain a work schedule in consonance with the shipyard schedule, material delivery dates, and available resources.

4. Integrate work within the division work centers to maintain a balanced workload.

5. Inform the Department Head of work progress, quality of work accomplished, significant trouble areas, and potential problem areas, with recommendations for their resolution.

6. Advise the Habitability Coordinator of scheduled work that will affect habitability.

7. Ensure that shipyard or ship's force personnel have timely access to spaces where work is to be accomplished within his division.

8. Immediately notify the Shipyard Coordinator when unsatisfactory or defective shipyard work is noted, and ensure that appropriate personnel in the chain of command are informed accordingly.

9. Ensure that ship's force work items within his division are completed on schedule.

10. Designate division Work Center Supervisors for each repair and/or alteration.

11. Accompany shipyard personnel, quality assurance representatives, and division Work Center Supervisors on joint inspections of all shipyard tests and inspections.

12. Prepare the division's portion of the SFWP by reviewing and guiding Work Center Supervisors in job scoping and perform the required interface actions for work centers within his division.

13. Screen and approve or disapprove work center requests (not previously authorized) for ship's force and shipyard work prior to forwarding to the Department Head for action.

14. Assist the Department Head in preparing the department's portion of the SFWP by interfacing his division's maintenance actions with the other divisions within the department and identifying maintenance actions that require interface with other departments.

15. Establish a program to ensure that all division supply requirements are anticipated as far in advance as practicable and are made known to the Supply Coordinator.

16. Identify planned maintenance requirements for equipment under his cognizance and develop a PMS (Preventive Maintenance System) package.

WORK CENTER SUPERVISOR. During the Pre-Overhaul Phase, the Work Center Supervisor, in conjunction with his Division Officer, prepares the work center's portion of the SFWP. He also determines the material requirements and submits them through ship's channels. During the availability, he provides direct supervision for accomplishment of and adherence to the SFWP schedules. The basic concept of SFOMS is that all levels of management must support the SFOMS Program. The Work Center Supervisors are the basic managers of ship's force work. The organization of work centers differs between ships and within a ship. Additionally, on some ships, similar work centers are grouped together and supervised by a Senior Petty Officer. Therefore, the term "Work Center Supervisor" refers to either the Senior Petty Officer in charge or the assigned Work Center Supervisor, whichever is the ship's established chain of command. The supervisor's duties include:

1. Schedule assigned jobs to be accomplished and assign personnel and other resources to complete them.

2. Provide daily status information to the Division Officer concerning work requests, job progress, manpower utilization, and problems.

3. Make inspections of assigned ship's force and shipyard work within his work center for completeness, workmanship, and absence of defects.

4. Witness all tests on jobs for which his work center is responsible and verify the results.

5. Report unsatisfactory shipyard work to the Division Officer.

6. Maintain control and accountability of JCNs within his work center.

7. Ensure that PMS requirements are performed on equipment under his cognizance.

8. Initiate requests for new work (not previously authorized) and forward them to the Division Officer for action.

9. Establishing procedures for control of SFOMS administrative work.

TAB III

COMPUTERIZED SFOMS

Pre-Overhaul Phase

As previously noted, the Pre-Overhaul Phase of SFOMS commences upon direction from the TYCOM that some type of SFOMS be implemented and designation of a Maintenance Manager by the ship. The computerized type of SFOMS maintenance actions are initially comprised of the computer-generated 4790/2K SFOMS Input Forms (Work Requests) for deferred maintenance actions contained in the CSMP using the NAVCOSSACT Automated Work Request Program. During the Pre-Overhaul Phase, the ship takes the following initial actions:

1. The 4790/2K SFOMS Input Forms are received and distributed to the appropriate work centers.

2. Requisition supporting material.

3. Prepare a Manpower Budget.

The SFOMS documents (4790/2K SFOMS Input Form, Manpower Budget, and DD Form 1348 or NAVSUP Form 1250) resulting from these actions are submitted to the activity providing ADP support for data processing and creation of a SFOMS Master File.

Two reports and an error listing are subsequently returned to the ship for job and personnel scheduling. Scheduling entries and data corrections are made directly on the reports/listing and returned to the ADP support activity for updating the SFOMS Master File. Updated reports are returned to the ship for review and scheduling adjustments prior to commencement of the overhaul.

Figure F-3 illustrates the flow of information for a computerized type of SFOMS during the Pre-Overhaul and Overhaul Phases.

Detailed instructions concerning completion of forms and interpretation of reports are contained in the SFOMS Manuals provided when implementation Action 4 (see Tab I) is accomplished by the TYCOM.

Job Scoping - Scoping is the documentation of the logical, step-by step sequential series of tasks (Key Ops) which must be performed to accomplish the assigned job. A Key Op is a portion of a job constituting a logical work sequence bounded by reasonable breaking points. This

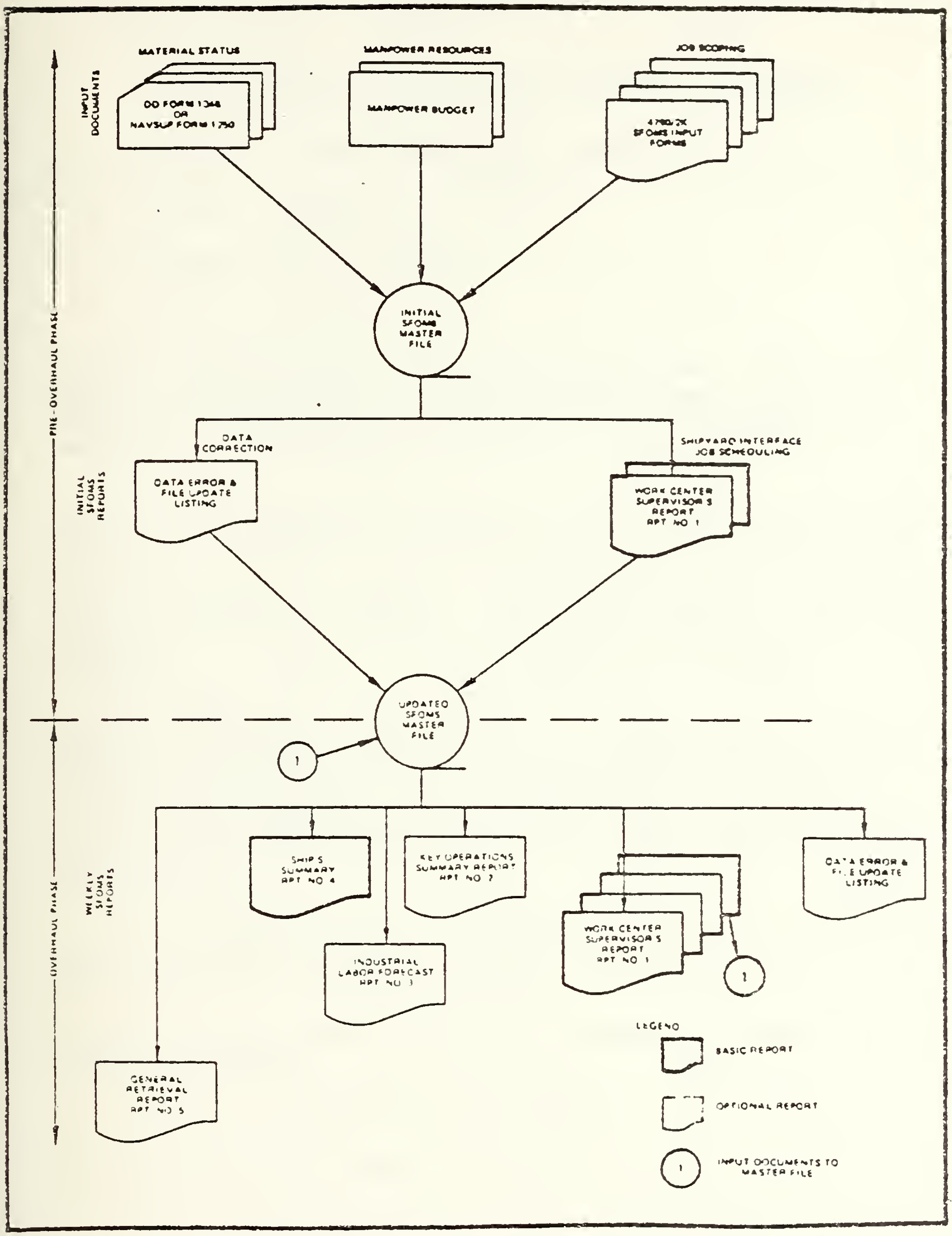


FIGURE F- 3 SFOMS MASTER FILE INPUT AND REPORTS

includes all work that can be accomplished by one work center in one continuous operation. Examples of typical Key Ops are:

- Inspect - which includes the disassembly of equipment when required.

- Remove - removal of equipment, components, etc.

- Repair and Modify.

- Assemble and/or Install.

- Operate or Test.

For each Key Op the job scoping tasks include: identifying the accomplishing Work Center, assigning a Key Op number and title, identifying a compartment or frame number where the work will be performed, and estimating the manhours to accomplish the work.

The importance of scoping jobs into logically detailed Key Ops cannot be over-emphasized, regardless of job size. A job should be subdivided whenever a portion of the work is to be accomplished by another work center or outside of the work center area (shipyard, private contractor, or tender). Other jobs, because of their size or nature, are best accomplished as one continuous operation. See Figures F-4 and F-5 for Job Scoping illustrations.

Job Scheduling - Next to realistic manhour estimates, job scheduling is the most important factor in establishing a balanced workload. Essentially, this task is an organized evolution of reiteration and refinement over a period of time. Job scheduling normally will be accomplished at the work center level; however, at the Department Head's discretion, it may become a function at the division level.

Job scheduling requires diligence and hard work. The biggest task is preparing the initial schedule. Once it is worked out, making changes and keeping it updated is simplified.

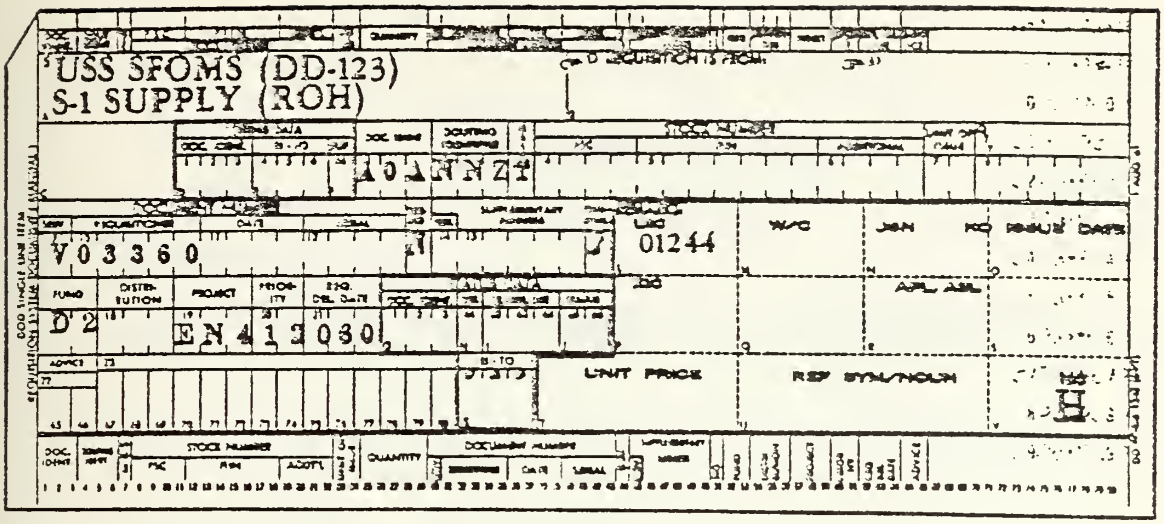
The following factors should be considered throughout the scheduling process:

- Adhere to shipyard key event dates.

- Schedule high priority jobs first.

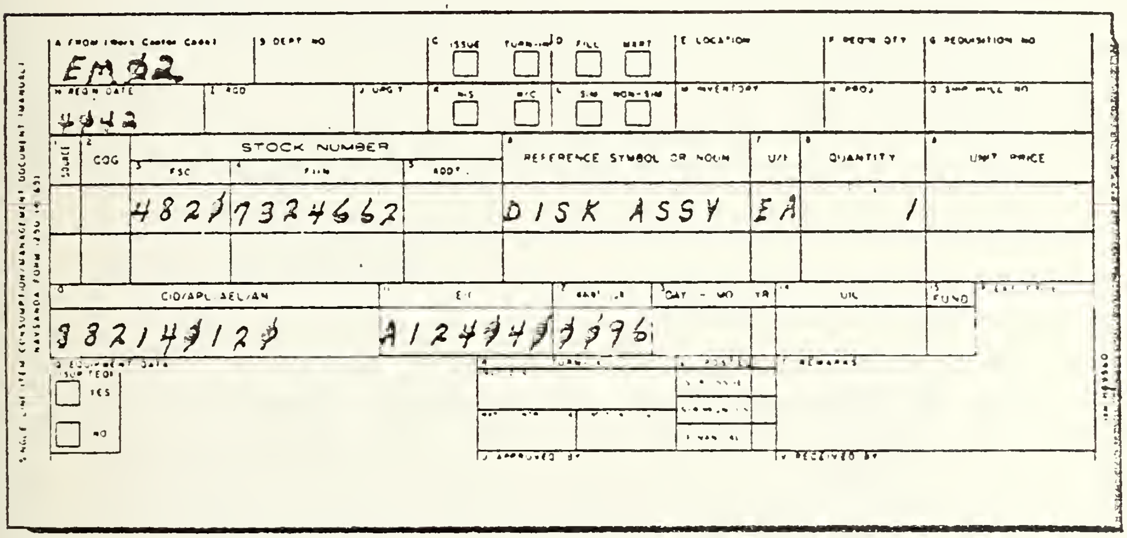
- Use low priority jobs to balance the workload.

- Schedule a light workload during the first and last few weeks of the availability. Allow time towards the end of the availability to take corrective action on discrepancy items and increased tempo of operations.



USS SFOMS (DD-123)
S-1 SUPPLY (ROH)
A0ANNZ1
V03360
01244
D2
EN412030
UNIT PRICE
REF SYM/NOUN
STOCK NUMBER
QUANTITY

DD Form 1348 (Manual)



EM02
STOCK NUMBER
4820 7324662
REFERENCE SYMBOL OR NOUN
DISK ASSY
EA
QUANTITY
1
UNIT PRICE
382140120
A1240400096

NAVSUP Form 1250

FIGURE F-5 SUPPLY DATA SOURCES

13ND PSNS ADP FORM
4790/2K (REV 2-73)

SFOMS ACTION

CHECK ONE ☒ ☐ ☐

MAINTENANCE DATA FORM

4790/2K SFOMS INPUT

MAINTENANCE ACTION

CHECK ONE ☐ ☐ X

USS NAVY SHIP/XXX-1

SHIP NAME/HULL NUMBER

JOB CONTROL NUMBER

SECTION I

AS DISCOVERED INFORMATION

12345 EE02 Ø216 T39BØØØ Ø 3 ØØ19 3

SECTION II–COMPLETED ACTION

SECTION III–DEFERRAL ACTION PLANNING

5 2

SECTION IV–REMARKS/DESCRIPTION

INSURV BOARD USE

VENT MOTOR
OVHL MTR IN COMPT Ø3-116-6Q XXX

SECTION V–KEY OPERATIONS

		KEY OP TITLE	LOCATION COMPART NO				
EEØ2	Ø1	SECURE/TAG PWR	Ø3-1/16-6Q	ØØØ1			
EEØ2	Ø2	DISASM/REP		ØØ1Ø			
EMØ9	Ø3	MACH/BAL RCTR		ØØØ8			
EEØ2	Ø4	REASM MTR		ØØ12			
EEØ2	Ø5	INSTL/TST		ØØØ3			

SECTION VI–INDUSTRIAL ACTIVITY DATA

MB
TEM
B

FIGURE F-5-1 JOB SCOPING ILLUSTRATION

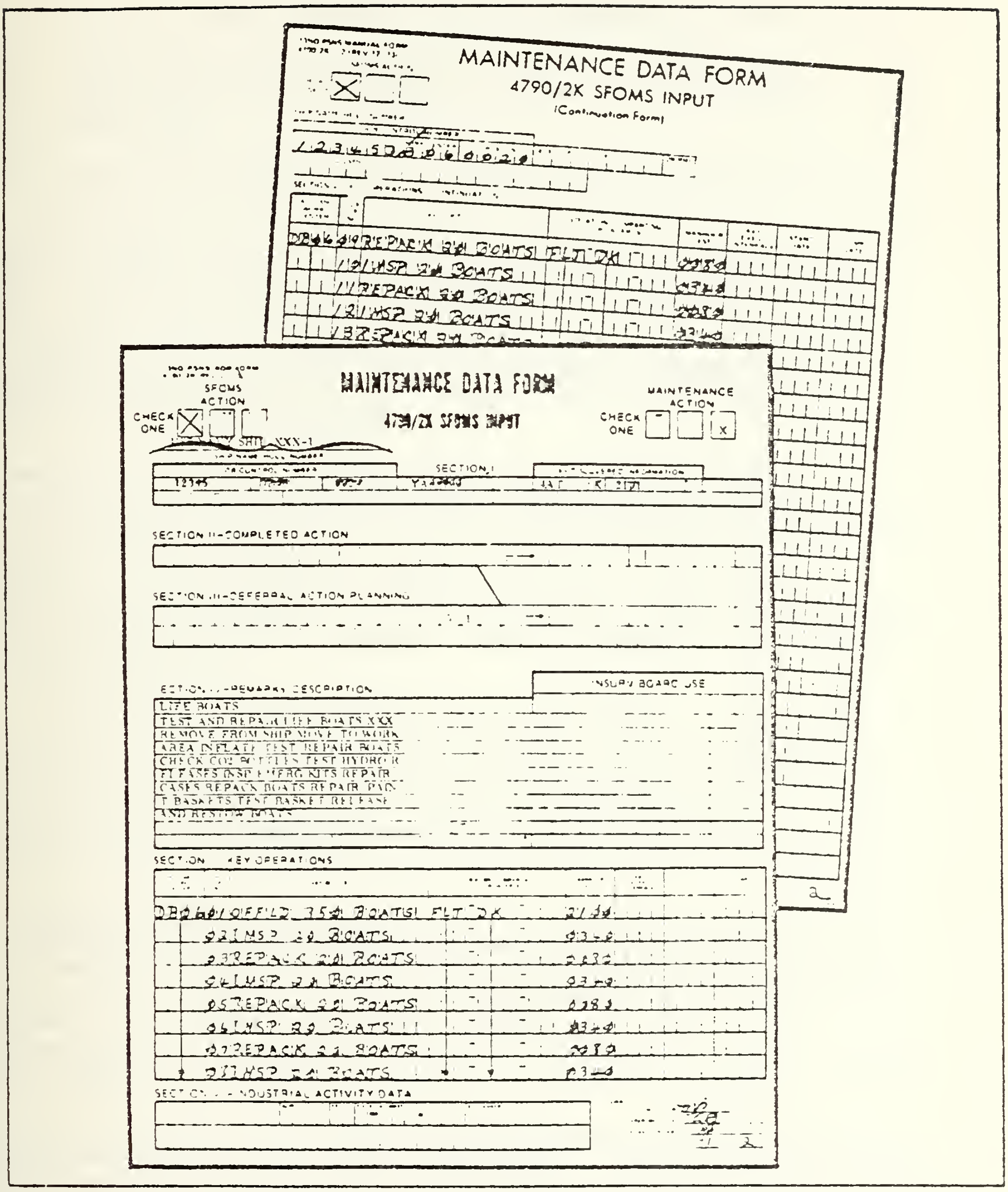


FIGURE F-5-2 JOB SCOPING ILLUSTRATION, EXTENSIVE JOB

- Allow adequate time for procurement of materials.

- Do not overlook the tender and FMAG assistance schedule.

- Ensure that accomplishing work centers are informed of lead work center requirements in terms of time, manpower, and schedule.

- Allow an adequate scheduling spread on short duration jobs.

The ship must develop a SFWP which includes complete scheduling within the known constraints of intraship interfaces and estimated manpower availabilities. Initially, job scheduling is accomplished using a Gantt chart designed to accommodate job scheduling directly on a computer report and then keypunching from the report to update the SFOMS Master File. After this initial effort, subsequent job scheduling is accomplished on the 4790/2K-2 SFOMS Input Forms in conjunction with the job scoping tasks.

When scheduling of the SFWP is completed, the information is forwarded to the supporting ADP activity for computer processing. When the supporting ADP activity is also the overhauling activity, the ship also forwards selected 4790/2K SFOMS Input forms for ship's force work that may interface with shipyard work. The overhauling activity completes Section VI of the 4790/2K SFOMS Input forms and has this information computer processed. Updated reports are printed and returned to the ship.

The SFOMS staff, in conjunction with department, division, and work center representatives, revise the ship's force work schedule as necessary, resulting in an approved SFWP. The approved package provides the basis for management reports concerning manhour expenditures and workload progress throughout the availability to accomodate changing conditions.

<u>Requisition Supporting Material</u> - As soon as practical, the Work Center Supervisors must identify their material requirements because of the lead time required to obtain some materials. Material requirements, including quantity and desired availability dates, must be forwarded to the Supply Coordinator. The best rule for the Work Center Supervisors to follow is to get their job requirements, including material needs, documented as accurately and rapidly as possible.

To ensure that SFOMS material requirements are met, the SFOMS organization provides for a Supply Coordinator. The Supply Coordinator and his staff are responsible to the Maintenance Manager for requisitioning, controlling, receiving, and issuing all material or repair parts required to directly support the ship's availability effort. Specific duties and responsibilities for the Supply Coordinator are detailed in Tab II. Appropriate support by Department Heads, Work Center Supervisors, and respective supply personnel is required.

The source of material requirements data is the Material Card Deck, which is created from selected information obtained from the DD Form 1348 or NAVSUP Form 1250 documents (see Figure F-4) prepared in accordance with NAVSUP (Naval Supply Systems Command) existing documents, the 3-M Manual, and additional instructions outlined in the appropriate SFOMS Manuals.

The SFOMS supply procedures include the identification and documentation of material requirements, creation of the material portion of the SFOMS Master File, automatic updating of the file utilizing prepunched supply status cards, entry of new requisitions identified after commencement of the availability, and printing of supply status information to monitor material support during the availability.

Ships undergoing an overhaul/repair under the cognizance of a SUPSHIP shall be responsible for requisitioning and controlling all material or repair parts required to directly support the ship's force maintenance efforts. The TYCOM is responsible for approving the material funding for the ship and authorizing the SUPSHIP to issue a job order to the Naval Supply Center. The Naval Supply Center assumes control of material expenditures and will provide weekly supply status and periodic financial information to the ship. The Supply Coordinator is responsible for updating the SFOMS Master File.

Manpower Budget - Each Work Center Supervisor must prepare a manpower budget for his work center which is used to determine the average manhours available per week to accomplish the industrial work scheduled in the SFWP. This is accomplished using a Work Center Manpower Budget form (see Figure F-6). Ship's internal policy will affect the manhour estimates; therefore, general guidance must be provided by the Department Head regarding leave policy which will be in effect during the availability; work center's prorated share for section watches, mess cooking, etc.; designated school quotas; and expected personnel gains and transfers. It is extremely important to estimate as accurately as possible, since the availability of ship's force industrial manpower will ultimately determine the amount of industrial work the ship's force is capable of accomplishing. Detailed instructions for preparation of the form are contained in the appropriate SFOMS Manual.

Overhaul Management Phase

As noted earlier, once the overhaul commences, the SFOMS staff will be occupied full time supervising, controlling, and administering the overhaul. They must be constantly alert to events that may impact the overhaul schedule. The ship's management can identify critical problems in sufficient time to allow corrective action by using computer progress reports and conducting staff meetings with

WORK CENTER MANPOWER BUDGET

PREPARED BY F McIVOR

22 OCT 73
DATE

PART 1

WORK CENTER	INDUSTRIAL AVAILABLE
EE02	Ø165

(a) Number of Assigned Enlisted Personnel 16

(b) Number of Hours in Standard Work Week 35

(c) Total Manhours Assigned (a x b) 560

(d) Total Operational Labor Manhours Required 395

TOTAL INDUSTRIAL LABOR MANHOURS AVAILABLE (c - d) 165

PART 2

Estimate the manhours required per week for the following operational labor categories:

INDUSTRIAL SUPPORT

(a) Work Center Supv	28	(e) Assisting Shipyard Workers.....	22
(b) Clerical....................	Ø	(f) SOAP Team....................	44
(c) Material Control...........	Ø	(g) PMS	17
(d) Fire Watch................	22	(h) SFOMS Staff.................. (for staff personnel use only)	

OPERATIONS

(a) Watch Standing.............	22	(d) Administrative Supply Duties ...	22
(b) Departmental Duties.......	22	(e) Mess Cooking	22
(c) Housekeeping.............	22		

ABSENCE

(a) Inspection (Personnel)	6	(d) Personal Military Affairs	38
(b) Training	38	(e) Leave	35
(c) TAD	35		

TOTAL OPERATIONAL LABOR MANHOURS REQUIRED 395

APPROVED BY MB — DIVISION OFFICER

TEF — DEPARTMENT HEAD

FIGURE F-6 WORK CENTER MANPOWER BUDGET

pertinent ship's force and shipyard personnel. Major tasks performed during the Overhaul Management Phase include: accomplishing the ship repair and overhaul actions, establishing a continuing program of data collection and analysis regarding the availability progress, updating the SFOMS Master File, and completing 3-M and SFOMS documentation requirements.

Once the appropriate data has been entered and known mistakes corrected, reports of the following nature may be printed for all Work Centers:

Manpower Report - used to see if a good balance exists in the Work Center between Productive Manhours Available (PRO) and Scheduled Manhours (SCH), on a week-by-week basis. If the balance is not good, e.g., SCH exceeds PRO, some jobs will have to be eliminated or rescheduled to correct the imbalance. This Report can also be used to find errors in productive and total manpower data in original input.

All Jobs Report - used to find errors in original input data.

All Material Report - used to find errors in original input data.

Normally, a weekly cycle for routine file updating and report generation is followed. The updating and report printing is done Friday through Monday so that a new set of reports reflecting the previous week's activity is ready Monday morning. File updating falls into two categories:

- Routine logging of MH EXP to active KO's accompanied by a re-estimate of MH REM or logging of an actual COMPL DATE. This continual revision of MH REM replaces the original MH EST with a succession of better MH estimates as work on the KO progresses.

- Other modifications of the data file such as adding or deleting JOB, KO or MAT records; revising KO SCHED START or SCHED COMPL dates; recording actual receipt dates for MAT STUB's, etc.

The worksheets used during the overhaul to effect the updates are:

Active Key Op Worksheet. This form is employed for entering one of three types of information: (1) Manhours expended and manhours remaining if the KO is still being processed. (2) Manhours expended and completion date if the job was completed during the week. (3) NC (no change) if no work was done on the job during the week.

When updating manhours expended on the active KO list, if manhours have been expended but the KO is not completed, then manhours remaining must be submitted. This permits re-estimating of the job as it

progresses. The computer will then ignore the initial and all previous estimates when computing the next manpower summary.

Data Entry Worksheet. This form is employed to change any Job or KO information.

If the scheduled start date for a job has arrived but the job has not been started, it should be rescheduled. If the manpower summary shows an overload in a given week, the necessary management action must be taken, such as rescheduling KO's, acquiring more manpower, working longer hours, dropping entire job or dropping a lower priority job to obtain the necessary manpower.

Material Log Sheet. This form is used to revise material data. It is normally used to show new material requirements, receipt or cancellation of material or new estimated delivery date.

The key to successful overhaul management is to assure that proper levels of management receive accurate and up-to-date reports and information regarding its progress. Detailed explanations concerning computerized output reports are contained in the appropriate SFOMS Manual.

TERMINATION PHASE

The SFOMS Post-Overhaul Termination Phase commences just prior to the post-repair trials. The Maintenance Manager must make preparations to terminate the SFOMS organization and make the ship ready for sea.

Actions required are:

- Establish a termination date for the SFOMS organization.
- Close out overhaul repair actions.
- Update the CSMP.
- Prepare for post-repair trials.
- Correct post-repair trial discrepancies.
- Prepare SFOMS Evaluation Report.

Establish Termination Date - A final submission date must be established for reporting manhour expenditures and Key Op (Key Operation) revisions. Departments should be requested to ensure that their work package status is as accurate and up to date as possible by the established termination date, at which time SFOMS Key Op reporting procedures will be discontinued. SFOMS maintenance actions that are incomplete at the termination date must be reported upon

subsequent completion. Such reports are normal 3-M procedures. The manhours entered are a total for the whole job, including time before and after the SFOMS termination date.

Close Out Overhaul Repair Actions - New work which will extend beyond the established SFOMS termination date should not be accepted for accomplishment during the availability. However, discrepancies must be accepted and corrected. Other new work is deferred in accordance with 3-M procedures.

To assist in monitoring completion of Priority 1 and 2 work, a listing of all Priority 1 and 2 Key Ops not completed through the SFOMS cut-off date should be distributed to the departments. This will provide departments, work centers, and the SFOMS staff with a Master Priority 1 and 2 Control List which should be annotated to show completion of each job after the cut-off date. Work completed after this date will be reported in accordance with 3-M procedures.

Unaccomplished low priority SFOMS work, which does not interface or interfere with completion of shipyard work, should be rescheduled for ship's force accomplishment after completion of the availability.

Update CSMP - An updated CSMP listing should be distributed to all departments and work centers reflecting the close-out of all completed availability work (ship's force and shipyard). Each work center and department should screen this listing and submit any further corrections/additions/deletions via 3-M reporting procedures.

Prepare for Post-Repair Trials - Review the Fast Cruise agenda in order that the ship's force may prepare for adequate drills and exercises to familiarize themselves with the operation of the ship as well as to identify equipment and system defects prior to sea trials. This effort is coordinated with the Ship Superintendent or SUPSHIPs representative as applicable. Since shipyard work on some systems may still be in progress, a specific list of work the shipyard intends to perform during the Fast Cruise, along with the number of personnel to work each shift, is required to assist in the planning. Systems which will not be partially or fully operation must be identified.

Ship responsibilities and support required for dock trials, sea trials, and consolidated operational tests (COT) must be defined by the shipyard. COT is a composite of individual system tests and inspections to demonstrate the successful operation of significant systems on the ship. A thorough investigation is required by the ship and shipyard to determine facilities and procedures necessary to effect adequate tests of major systems before departing for the sea trial.

Post Repair Trial Discrepancies - The reporting and controlling of discrepancies on ship's force/shipyard work during sea trials is recommended. These trials are intended to serve two primary purposes: (1) prove out ship systems by subjecting them to full operating conditions under qualified observers; and (2) act as a vehicle to identify overhaul/

repair work discrepancies and to facilitate progress toward an operationally ready ship.

An automated overhaul/repair discrepancy reporting program, known as DISC (Discrepancy Identification System Checkout), has been developed. It is applied at the direction of the Type Commander. DISC provides the ship with a method of recording discrepancies discovered during the post-overhaul trials and controlling their correction. The program uses a four-part input to prepare a machine listing.

The SFOMS Maintenance Manager must reaffirm ship's policy regarding the procedures for ship's force sign-off of completed/accepted shipyard job orders. These procedures must be rigidly enforced to preclude unauthorized personnel signing-off shipyard accomplished job orders. Shipyard work in a commercial overhaul is formally signed off only by SUPSHIPS or his authorized representative.

Prepare Evaluation Report - At the completion of the availability, the ship shall provide an evaluation report on the SFOMS program. This evaluation will be used for guidance in preparing for future overhauls and updating the SFOMS program. The evaluation should include lessons learned, problems encountered, their solutions, and recommendations for future improvements. In addition, "return costs" data should be supplied, i.e., actual manhours, material expended on ship's force jobs, scheduling interface problems encountered, actual availability of industrial manpower, and similar information, to the TYCOM and cognizant PERA.

TAB IV

MANUAL SFOMS

The requirements of the manual SFOMS are enumerated on page F-6 and are accomplished in three phases - Pre-Overhaul Phase, Overhaul Management Phase, and Post-Overhaul Termination Phase. Manual SFOMS, when selected by the TYCOM, will be implemented by sequencing the required actions with the TYCOM's overhauling planning schedule of events (see Tab I).

<u>PRE-OVERHAUL PHASE</u>

The first action to be taken by the ship to implement manual SFOMS is the appointment of a SFOMS staff under the direction of a Maintenance Manager who will be responsible to the CO/XO for the coordination of the entire overhaul effort. The SFOMS staff required for the manual SFOMS may include:

- SFOMS Coordinator
- Shipyard Coordinator
- Training Coordinator, and
- Department Coordinators

Other personnel required to support the system include Department Heads, Division Heads, and Work Center Supervisors.

The responsibilities of all staff members and other personnel that may be involved in a SFOMS Program are described in Tab II. Although many functions can be combined, all listed responsibilities should be reviewed and considered.

After appointment of a Maintenance Manager, the ship takes the following initial actions during the Pre-Overhaul Phase:

1. Prepare a Manpower Budget.
2. 4790.2K's scoped and scheduled.
3. Requisition supporting material.

<u>Manpower Budget</u> - The first requirement in the manual SFOMS for the identification of the ship's manpower resources is to establish the list

of work centers, the number of people within the work centers, and the total number of people on board who will be available during overhaul. For planning purposes, and in lieu of more accurate information, use 80% of present on board personnel to arrive at these figures. This information forms a base in the SFOMS Program which will be compared against each work center's work load. It also provides the SFOMS Manager with a total manpower count. Figure F-7 provides a sample format for this list.

Next to be determined is the number of manhours that are available to be expended by each man during each week of the overhaul period. For documentation purposes, only normal working hours are to be considered, and Saturdays, Sundays, and holidays are not counted. Each work day is considered to provide seven (7) hours of productive labor for each individual. Table F-7 illustrates an overhaul calendar that lists the productive manhours available each week of the overhaul for each individual.

Figure F-8 illustrates a Non-Industrial Work Center Planning Sheet to assist Work Center Supervisors in computing non-industrial manhour assignments.

All persons up to and including Department Heads must be accounted for on a Work Center Planning Sheet. In completing the Planning Sheet, only regular workdays count and each workday is 7 manhours. Weekly manhours are filled in with the number of manhours available for each week. This figure is obtained from Table F-7 Table of Manhours per Individual Week. For example:

- A man is scheduled to go on 7 days leave, starting on Saturday and returning on Sunday. Monday of the week he is gone on a holiday. For planning purposes he will be on leave for four work days or 28 manhours.

- Your Work Center provides the person for the quarter-deck messenger watch for the whole duty day (24 hours) - 7 manhours are charged for each work day you provide the watch.

Each Work Center Supervisor will fill out a Planning Sheet for the number of weeks of the Availability and submit one copy to their Department Head. The second copy is retained by Work Center Supervisors.

Job Scoping - After preparation of the Manpower Budget Planning Sheets, by which we have identified force available, non-industrial manhours requirements, and manhours remaining for industrial work, SFOMS work requests have to be prepared to describe the industrial type work that is to be scheduled for accomplishment during the overhaul period. The industrial type 2K's for SFOMS are prepared as usual by the Work Center Supervisor in accordance with established 3-M procedures and instructions given below.

TABLE F-7
TABLE OF MANHOURS PER INDIVIDUAL WEEK

START	COMPLETE	NUMBER OF WORK DAYS	NUMBER OF MANHOURS FOR EACH WORK WEEK
7 OCT 74	- 11	5	35
15	- 18	4	28
21	- 25	5	35
29	- 1 NOV 74	4	28
4 NOV 74	- 8	5	35
11	- 15	5	35
18	- 22	5	35
25	- 29	4	28
2 DEC 74	- 6 DEC 74	5	35
9	- 13	5	35
16	- 20	5	35
23	- 27	4	28
30	- 3 JAN 75	4	28
6 JAN 75	- 10	5	35
13	- 17	5	35
20	- 24	5	35
27	- 31	5	35
3 FEB 75	- 7 FEB 75	5	35
10	- 14	5	35
18	- 21	4	28
24	- 28	5	35
3 MARCH 75	- 7 MARCH 75	5	35
10	- 14	5	35
17	- 21	5	35
24	- 28	5	35
31 MARCH 75	- 4 APRIL 75	5	35
7 APRIL 75	- 11	5	35
14	- 18	5	35
21	- 25	5	35
28	- 2 MAY 75	5	35
5 MAY 75	- 9	5	35
12	- 16	5	35
19	- 23	5	35
26	- 30	4	28
2 JUNE 75	- 6 JUNE 75	5	35
9	- 13	5	35
16	- 20	5	35
23	- 27	5	35
30	- 3 JULY 75	4	28
7 JULY 75	- 11	5	35
14	- 18	5	35
21	- 25	5	35
28	- 1 AUG 75	5	35
4 AUG 75	- 8	5	35
11	- 15	5	35
18	- 22	5	35
25	- 29	5	35
2 SEPT 75	- 5 SEPT 75	4	28
15	- 19	5	35
22	- 26	5	35
29	- 3 OCT 75	5	35

WORK CENTER __________ PLANNING SHEET

WEEK NUMBER	1	2	3	4	5	6	44	45	46	47	48	49	50	51	52	TOTALS
WEEK MAN HOURS																
1. TOTAL PERSONNEL																
2. LEAVE																
3. AT SCHOOL																
4. SOAP TEAM																
5 LINE I MINUS TOTAL 2,384																
6. MAN HOURS AVAIL																
7. NON-INDUSTRIAL MAN HOURS ASSIGNED																
TRAINING																
PERS. SERVICES																
PMS																
SUPERVISION																
ADMINISTRATION																
MESS COOK																
COMPT CLNR/JANITORIAL																
FIRE WATCH																
WATCHES/QTR DK/COLD IRON																
TROUBLE CALLS																
SHORE PATROL / BRIG																
DUTY DRIVER																
SUPPLY STOREROOM/OFFICE																
STEWARDS/COOKS/FOOD PREP																
GALLEY/SHIPS STORE																
LAUNDRY/DRY CLEANING																
POST OFFICE/SHIPS OFFICE																
GEN. CLEAN-UP																
BARBER SHOP																
DISBURSING OFF																
PHARMACY/SICK BAY																
WORKING PARTIES																
TOTAL LINE 7																
8. INDUSTRIAL WORK LINE 6 MINUS LINE 7																

NMD-PRSY-5231/11 (REV. 6-73)

NON-INDUSTRIAL WORK CENTER PLANNING SHEET

TABLE F-8

Sections I, II, and IV of the OPNAV 4790/2K are prepared as usual, ensuring that a Job Sequence Number (JSN) obtained from the Work Center Log is included in Section I and that Section IV reflects all of the steps that will be required to accomplish the job. Job scoping is accomplished using the detailed instructions provided in Table F-8 and entering the required data on the SFOMS Overlay illustrated in Figure F-10.

Job Scheduling - In the manual SFOMS, the industrial data must be arranged in tabular form on Industrial Workload Planning Sheet(s) by Work Center, and used as a schedule loading report. See Figure F-11.

The Non-Industrial Work Center Planning Sheet (Figure F-8) constitutes one half of a manual SFOMS schedule load report; the other half being the Industrial Work Load Planning Sheets (Figure F-11) the sum of which may be compared with line 8 of the Non-Industrial Planning Sheet. Multiple sheets are maintained so that all Work Center Planning Sheets may be updated and more than one (1) page of industrial keyops can be listed. Detailed instructions for the preparation of the industrial workload are contained in the appropriate SFOMS manual. In summary, these instructions are to:

1. Arrange the OPNAV 4790.2K's in order of systems and key event numbers.

2. From each 4790.2K, list job ID number, keyop number, job description, keyop title, start and completion dates, and manhour estimates on the Industrial Workload Planning Sheet.

3. Draw a "Gantt" type bar, from start to completion date. This visual display of job duration will aid the Work Center Supervisor in the next task, the linear distribution of estimated manhours from scheduled start date to scheduled completion date.

4. Calculate the required manhours for each week of the job duration and list in the appropriate block, under that week. Insure that the sum of each week equals the total manhours in the M/H estimate column.

5. Add each week's manhour load vertically by keyop and list the subtotal for the sheet. List the weekly total which will be the sum of the sub-total from each sheet.

6. On the last sheet, enter the amount of work force manhours from line #8 of the Non-Industrial Planning Sheet (Figure F-8) Fill in each week with this figure and compare it with the total workload manhours to analyze the workload for imbalance.

Factors to consider throughout the Job Scheduling process are detailed on pages 31 and 35 of Tab III.

GUIDELINES FOR JOB SCOPING	
Step 1.	Break the job down into a logical sequence of tasks to accomplish repairs.
Step 2.	Identify the work center that will perform each task.
Step 3.	Estimate the man-hours for each task. This information is provided by the work center supervisor responsible for accomplishing the specific task. NOTE Number of units to be repaired must be considered.
Step 4.	Sort repair steps into key operations and assign key operation numbers (starting with number "01") to each key operation. NOTE Only one work center can be included on a key operation and a key operation should include all work that can be accomplished by a work center in one continuous operation. Assemble key operation information under a single title and a single man-hour estimate. Remember each job requires entry on a 4790/2K SFOMS input format.
Step 5.	Above information is now ready to be entered on the 4790/2K SFOMS input forms.

TABLE F-9

OPNAV 4790/2K (Rev. 6-73) SHIP'S MAINTENANCE ACTION FORM (2-KILO)

JOB CONTROL NUMBER

SECTION I. IDENTIFICATION

1. SHIP'S UIC | 2. WORK CENTER | 3. JOB SEQ. NO. | 4. APL/AEL

6. SHIP'S NAME | 9. EQUIPMENT NOUN NAME

8. HULL NUMBER | 13. IDENT/EQUIPMENT SERIAL NUMBER | 14. EIC

15. SAFETY HAZARD | 16. LOCATION (Compartment/Deck/Frame/Side) | 17.

CONFIGURATION CHANGE | FOR INSURV USE

18. ALTERATIONS

SECTION II. DEFERRAL ACTION

SECTION III. COMPLETED ACTION

FOR SELECTED EQUIPMENTS ONLY

SECTION IV REMARKS/DESCRIPTION

35. REMARKS/DESCRIPTION

SECTION V SUPPLEMENTARY INFORMATION

SECTION VI REPAIR ACTIVITY PLANNING/ACTION

S	JOB ORDER	JOB TITLE	KEY	FISAL	PAE ID	SCH ID

F	KEY OP	SHOP	MAN HOUR	KEY OP TITLE	KEY EVENT	START YYMDD	COMPL YYMDD	WORK CENTER
O	01	92	124	DISASS REP	2153	42501	42514	F301
X	02	92	55	REASS TEST	2256	40615	42524	
S	03	95	15	ADJUST SET	2256	40702	40705	

FIGURE F-10 SHIP'S FORCE INDUSTRIAL WORK REQUEST

SHT #1

Key Events of the Availability

DRYDOCK 5-7/6-4

LITE OFF 7-3-74

Job ID No. Keyop No.	Job Description Keyop Title	Start Compl.	M/H Est.	WEEK 1	2	3	4	5	6	7	8	9	10	11	12
EB01-A106 01	#1 FC DRFT BLOWER DISSASSEM REPAIR	5-1-74 6-14-74	184	16	40	25	25	25	25	28					
02	REASSEMBLE AND TEST	6-15-74 6-24-74	55								35	20			
03	ADJUST + SET	7-2-74 7-5-74	15										12	3	
EB01-A107 01	2-600# RED VLVS OVHL	6-21-77 7-3-73	55									20	35		
EB01-A108 01	3-PRESS REG VLVS OVHL	6-26-74 7-3-74	35										35		
EB01-A109 01	#2 BRINE O[illegible] VLV REM	5-9-74 5-9-74	3			3									
02	REPL GASKET REINSTL	5-10-74 5-10-74	5				5								
EB01-A110 01	BOTOM BLOW PIPING REPAIR LEAK	5-1-74 5-10-74	70	30	40										
Sub Total Manhours (This sheet)			X	46	80	28	30	25	25	28	35	40	82	3	
Total M/Hrs from Sht #1, Sht #2, etc.			X												
Total M/Hrs Ind [illegible] Remaining (from [illegible] 48 Non Ind Plan-Sheet' (Last Sht. Only)			X												

FIGURE F#11 INDUSTRIAL WORKLOAD WORK CENTER PLANNING SHEET

Data from the Industrial Workload Planning Sheets may be summarized by division, department or ship, by adding individual work center data at the desired level of detail, and for the desired unit. For example, the Maintenance Manager may wish to compile the following data for each week of the overhaul:

- Total men assigned
- Total manhours available
- Total manhours assigned to non-industrial
- Total manhours remaining for industrial
- Total industrial scheduled load

Department heads should compare the total MH's available for industrial work with the total industrial load in MH's for each of their work centers.

Requisition Supporting Material - The next step, upon completion of the Industrial Work Load Planning Sheets, is to order all material to be used on a job using the NAVSUP Form 1250 (described in Tab III) and document such action using the Overhaul Planning Material Log Sheet, Figure F-12. Detailed instructions for completion of the form are contained in the appropriate SFOMS Manual.

OVERHAUL MANAGEMENT PHASE

During the Overhaul Management Phase, the Work Center Supervisor will manually maintain the initial records in an up-to-date status. For example:

- Weekly manhour expenditures for each Key Op may be recorded under each schedule load estimate to provide the status of manpower expenditures for each Key Op.
- Normally, at least one schedule adjustment will be made each week to balance work load and work force for the ensuing week.
- Material received to accomplish a particular Key Op of a JSN will be logged (when received) on the Overhaul Planning Material Log Sheet.
- Personnel changes will necessitate changes, as they become known, to the available manhours reflected in the Non-Industrial Work Center Planning Sheets.

The importance of maintaining up-to-date manpower, workload, and material records cannot be over-emphasized.

MATERIAL STUB #	DESCRIPTION	UNIT OF ISSUE	QTY.	ESTIMATED DELIVERY DATE MM/DD/YY	DATE RECEIVED MM/DD/YY	WORK CENTER	JOB SEQUENCE # JSN	KEY OP
Ø1234567	BEARINGS	EA	36	3/10/75	/ /	EMØ1	Ø123	Ø1
Ø1234572	GREASE	LB	5	4/22/75	/ /	EMØ1	Ø123	Ø2
Ø12346ØØ	STUDS	EA	48	4/22/75	/ /	EMØ1	Ø123	Ø3
Ø1234675	BELT	EA	2	5/ 2/75	/ /	EMØ1	Ø142	Ø1
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			
				/ /	/ /			

FIGURE F-12 OVERHAUL PLANNING MATERIAL LOG SHEET

TERMINATION PHASE

All aspects of this phase of manual SFOMS are identical to the Termination Phase of computerized SFOMS except for the establishment of a final submission date of ADP data. The requisite termination actions are enumerated in Tab III.

APPENDIX G

1200 PSI PROPULSION EXAMINING BOARD (PEB)

LIGHT-OFF EXAMINATION (LOE) MATERIAL READINESS REQUIREMENTS:

Currently, Naval and Commercial Shipyards are not programmed to reach complete propulsion plant readiness incidental to the conduct of the LOE as chartered in OPNAVINST 3540.4. Until such time that the "Complete Overhaul" concept, as provided for in the 1200 PSI Improvement Program can be achieved and programmed in our yards the following procedures will be utilized by the 1200 PSI PEB:

a. The preparation of the propulsion plants to be examined should be along the line of the TYCOM Naval Distillate Conversion Certification or other comparable ship yard developed test program. The goal of the test program is to insure that the propulsion plants to be examined are complete and that the necessary tests and certifications have been performed prior to examination by the Board. Recognizing the type of overhaul planning currently in effect and the necessity to permit an orderly program for attainment of the total plant examination envisioned in the OPNAV Charter the following procedures will be used by the Board for Light-off Examinations. (LOE's).

(1) On multiple plant ships the board will make repeat visits so that each complete propulsion plant can be examined separately. Each plant to be examined should be complete and ready for light-off. The goal of the Board is to certify the plant/ship for auxiliary steaming, however, the examination covers all equipment associated with steaming auxiliary and main propulsion equipment. To this end, the spaces housing equipment in direct support of auxiliary plant operations must be complete with the exception of those devices, such as safety devices and overspeed trips, which require main steam for test. Example: Ships will have one main

machinery space with its associated Boiler area/space, emergency diesel room and one auxiliary machinery room (if auxiliary machinery such as evaporators, fire pumps, etc. are remote to the main machinery spaces) ready for examination. On single plant destroyers, main propulsion and auxiliary spaces should be ready and a single examination is envisioned.

(2) Sufficient shipboard machinery and equipment must be serviceable to provide independent normal combustion air, fuel oil transfer and stowage capability, reserve feedwater, low/high pressure control air, firemain pressure, auxiliary cooling water, electrical and control sources together with normal emergency sources. On all machinery, equipment and systems which are to be used in providing services, all safety devices and equipment must be in a tested condition prior to light-off with the exception of those devices requiring main steam. All damage control equipment and other standard safety features within the propulsion spaces must be intact and in a satisfactory condition. By definition this will include, secured deck plates, bilges clean and oil free, hot surfaces lagged/insulated and valve labels together with posted operating and safety precautions in place.

(3) Ship's Force work lists should be completed in support of the material readiness cited above. Every effort should be expended by the industrial activity to integrate ship's force work into their overhaul program to insure a joint effort in attaining the required readiness.

(4) On multiple plant ships the Board will monitor the material condition progress and operating practices during each successive plant examination. Unsafe or unsatisfactory conditions noted on previously certified plants could be cause for withdrawal of the certification.

(5) Exceptions to "complete plant readiness: for an individual plant due to material deficiencies with specific equipments must be addressed on a case by case basis and approved by the Board.

Reproduced from CTF 75 Logistics/Material Officer
Memorandum Dated 12 Sept. 1973

COMMON QUESTIONS ASKED BY PEB

EOOW

1. What are the requirements for testing an idle boiler?
2. What is the purpose of a surface blow?
3. What happens when you lose ACC air?
4. Describe the boiler purge requirements for your ship.
5. Locate (verbally describe) the sources of 1200# steam for your ship.
6. Describe proper cross connect procedures.
7. What is the normal disposition of your H.P. drains?
8. How often must you test a steaming boiler?
9. How do you (water) treat a boiler before taking it off the line?
10. What are the chloride limits of:
    a. steaming boiler?
    b. condensate?
    c. make up feed?

TOP WATCH

1. What happens when you lose ACC air?
2. How do you layup a boiler dry?
3. How fast should you rotate soot blowers when blowing tubes?
4. What are the two safety requirements when operating soot blowers?
5. What is your main feed pump low suction pressure trip setting?
6. What is the prescribed setting for your low lube oil alarm?

7. Describe procedures involved in securing burners.
8. How do you tell if you have carry over?
9. What systems dump to the atmosphere?
10. What are the requirements for chlorinating fresh water?
11. Operating temperatures of 1200 psi superheated and desuperheated steam?
12. How do you take on make up feed?
13. At what water level are your high water and low water alarms set?
14. What are your forced draft blower speed limits?
15. What is a tolerable variation between blower speeds when running flexibility tests?
16. How do you handle a low water casualty? High water?
17. Describe the line up of fuel oil valves to the burner.

L KING

1. What are the dump limits on boiler water? Reserve feed? (chloride, hardness, conductivity?)
2. What are the steaming limits on DFT? Desuperheated steam?
3. What is the maximum extent to which you can chemically treat a boiler?
4. Be prepared to discuss recommendations you would make to the Commanding Officer under various hypothetical engineering situations.
5. What are the treatment requirements before securing a steaming boiler?
6. What are the test requirements on a laid up boiler? On a boiler under a steam blanket?

Reproduced from COMCRUDESLANTINST 3540.24

REPRESENTATIVE EXAMINATION QUESTIONS

1. Assume the ship is steaming auxiliary and the only condensate pump on the line fails. What will happen?

2. Assume that before the condenser flooded the lower level MM either restarted the failed pump or started a standby pump. What would you expect?

3. Assume the DFT gets down to 100 degrees and you have 10 psig of AE pressure. Is this a safe condition?

4. Assume you've had to wrap up. What do you have to do to get the plant back on the line?

5. Assume you lose fires because of a loss of FO suction, but you regain FO pressure before the boiler drops below 90% of working pressure. Would you relight fires? If not, why not?

6. Assume boiler chloride level begins rising. What do you do? At what point, if any, do you decide you have to secure the boiler?

7. Assume you're steaming auxiliary and the fireroom top watch reports that you have a safety lifting on the steaming boiler. What do you do?

8. What is your booster pump line up while steaming auxiliary?

9. Why steam "modified main" vice auxiliary? Does running the MFP at 1500 psi discharge pressure have any effect on being able or not being able to steam auxiliary vice modified main?

10. Assume chloride level was going up on the boiler you're steaming and the Oil Shack, backed up by the BT top watch, recommended bottom blowing the boiler. Could you/would you do it?

11. Would you light off a main feed pump with discharge valve open or closed? Why?

12. Is ND more dangerous than NSFO? Is ND at room temperature more volatile than NSFO at 140 degrees Fahrenheit?

13. Assume you lose control air - which way will boiler water level go? What action should be happening on the MM level?

14. Assume that main sea valve remote operating gear is not installed. Is this a safety hazard for steaming auxiliary?

15. Does a ship's service generator trip off the line on low steam pressure?

16. What would you expect to find inside a boiler?

17. When steaming auxiliary normally, what are "normal" figures for the following?

a. Number of burners in use.
b. Superheater outlet temperature.
c. Desuperheated steam temperature.

What would changes in the above mean to you as an EOOW?

18. If the MMOW reports he's losing vacuum on the engine he's steaming, what should he be checking?

19. How often do you have to shift fuel oil suction while steaming auxiliary? How low do you allow the service tank on suction to go before shifting?

20. What are boiler water chemistry specifications for a steaming boiler?

21. When should boilers be tested for water chemistry?

22. How often should a steaming boiler be bottom blown? At what pressure or after what time frame do you bottom blow? Do you give the boiler a short or a long bottom blow? Why?

23. How are the emergency diesels lined up in port? Any difference in line up between circumstances when you'r on ship's power and when you're on shore power?

24. If the boiler you're steaming starts showing a decrease in steam pressure, what could the cause(s) be? Is there any point at which the boiler would have to be secured if pressure could not be maintained? If so, at what point would this be and why?

25. What is the ship's normal in-port "hotel" load? What do you do if a generator becomes overloaded? Can you keep a generator on the line at over 100 percent load?

26. What protective features does a main feed pump have?

27. When lighting off a main feed pump, how do you ensure you have adequate cooling water flow through it?

28. What is the proper procedure for shifting FO/LO strainers?

29. If you have an oil spill in port, to whom do you report it? How do you contain it?

30. If your steaming boiler suddenly starts smoking black, what could the causes be?

31. What protective devices does a boiler have?

32. How do you ensure the boiler has adequate superheater protection?

33. What protective features does the DA tank have?

34. If the Oil Shack reports oxygen in DA tank samples, what could the causes be?

35. What protective devices/features do SSTGs have?

36. How do you parallel generators?

37. If a major fire erupts in a machinery space, what should be done? What should you do?

38. How many contaminated tanks does the ships have? What are their capacities? How can you get bilge water into them? How do you pump them? Where are they located? What happens if one overflows; i.e., where does a contaminated tank overflow to?

39. What machinery operates off 1200 psi main steam, 1200 psi desuperheated steam and 600 psi steam?

40. How does superheat temperature vary with boiler load? At what boiler load would you expect the highest superheat temperature?

Reproduced from COMNAVAIRLANT Ltr. Ser 1354 dated 2 Mar. 73

Questions asked by CAPT LATHAM during PEB Re-Examination

Auxiliaries Officer

Assume steaming 1A boiler - walk me through the main plant as a drop of steam or a drop of water.

Why steam "modified main"?

Say auxiliary exhaust goes up in pressure, what is going to happen?

Where is the superheater installed in a boiler?

Can you bottom blow a steaming boiler? Mud drum only?

Electrical Officer

How well qualified do you feel in areas other than electrical?

What is gland sealing?

Have you ever been inside a boiler? How do you get in a boiler? How big is it inside a boiler?

Assume you're shifting FO suction on a steaming boiler and lose suction. What's going to happen and what should you do about it?

Fires out, lost load, purge cycle on boiler complete and you look inside the firebox and see oil inside on the deck. Would you let the BT light fires?

A Division SCPO

What is your "gut" feeling of your qualification as a supervisory watch?

What will happen in case of a loss of control air?

How many SSTGs do you need to steam auxiliary?

Could you steam five generators easily? How many main plants would you need?

If exhaust goes into auxiliary condensers, why do you need a main engine lit off?

What is the limit on chloride steaming auxiliary? If the oil shack says you have 3.0 epm and engineering officer is not on board, what do you check?

Questions asked by CAPT LATHAM during PEB Re-Examination

You mean you could get bilge water in the condensate pump? If the water level in the main condenser is higher than the water level in the bilges, how could you suck bilge water into the condensate system?

Have you ever been inside a boiler? Where is the superheater? What does it look like? Is it a big, round thing? Is it a bunch of little tubes?

If you're going to be a watch officer in charge of the electricians and boilermen, don't you feel you should know what a boiler is like and what your people are doing?

If you lose air, what is the check man going to be doing? What happens to the generators? Why?

Is 850 degrees way above saturation temperature? How far above? A long way above or a little way above? You don't feel there's enough temperature difference to turn any carryover water into steam before it reaches the generator?

How is the console operator going to close his main steam stops?

M Division Material Maintenance Officer

How well qualified do you feel to be a watch supervisor?

How did you get qualified as a watch supervisor?

How much time have you been spending trying to learn the MM and EM side of things?

What is the gland exhauster fan?

Does the gland exhauster fan have anything to do with gland sealing steam? What is gland sealing steam? What pressure is it? Is that all it is when atmospheric pressure is 14 pounds?

Ever seen the inside of a main condenser? Tubes run horizontal or vertical? Can you get into the salt water side of the condenser?

Can you lay down in the salt water end of a condenser?

Assume you're the supervisory watch and you have a high water casualty, what would you expect to happen to the generator?

What is the saturation temperature for 1200 psi steam?

Won't any water carryover flash into steam before it reaches an SSTG?

Questions asked by CAPT LATHAM during PEB Re-Examination

How do you feel about ND conversion? Is the ship now more dangerous?

Assume you've lost fires and purged but BT reports oil still on deck in the firebox, will you let him light fires? Why -- won't that oil just burn?

What does condensate depression mean to you? That's an area you should look into.

A Division Officer/SFOMS Representative

How well qualified do you consider yourself to be?

How well do you know the plant?

What if your petty officers aren't competent?

Ever been inside a boiler? How big is the firebox? What does the superheater look like?

What is the DFT? What does it do?

Is steam pressure from the exhaust system going into the DFT? What is exhaust?

Is the air ejector part of this system?

What is the name of the pump(s) that feed the DFT?

Doesn't condensing steam create a vacuum? If so, why do you need an air ejector? If watch wants to secure air ejectors, would you lose vacuum?

Leading BRC

What's the difference between a 1200 psi and a 600 psi boiler?

Does a 1200 psi boiler have more water in it than a 600 psi boiler? How about steam flow - is it greater or less?

How much water is in the boiler in gallons?

Assume boiler salts up and has to be dumped - how much water will it take to refill it?

What do you suppose the elctricians are doing when you're on watch? Are all the generators tied together? When the voltage on one goes up, does the voltage on all the others go up?

What do you mean by "taking the load"?

Do you feel you have enough knowledge to supervise a machinist mate top watch?

Questions asked by CAPT LATHAM during PEB Re-Examination

Assume MMOW requests permission to dump a condenser hot well, would you let him? Can an MM dump a hot well - is there a valve on the hot well that would let him?

What does gland sealing steam do? Does it keep the air from going into the turbine.

How many turbine blading stages are there in an SSTG?

High water casualty - Will you close the main steam stop? How will you do it? What will happen to the generator - Who will take it off the line? Where is the trip?

When the electrician takes the generator off the line, does the turbine slow down? How does it slow down?

B Division Officer

Do you feel capable of standing supervisory watch?

Have you been inside a boiler?

Assume you're inside and you see a big crack in the floor - is this normal? Does that mean anything to you?

What does a superheater look like?

Assume you find what is the mud drum with tubes coming out of it and there's a layer of something about 6" deep on top of the drum. Is this normal?

How many SSTGs do you have on the line normally when steaming auxiliary?

Assume EM calls up and wants to split the electrical load - would you let him? How are the generators set up?

Assume SSTGs are in parallel and a big load surge hits, will all SSTGs take the load or just one?

Take a drop of water from where it starts to where it leaves the condensate system.

Steaming auxiliary and condensate pump stops, is this going to cause a loss of vacuum?

MMOW gets pump fixed and then starts two condensate pumps. Are you going to be worried? Assume MMOW calls in and says high water in the DFT, would you expect this?

Assume water level goes out of sight in DFT but the booster and feed pumps are still running and then MMOW starts two condensate pumps so water level starts coming up in the DFT. What would you think would happen?

If the DFT is filled with cold water, would you lose a booster pump? If you lost a booster pump, would anything happen to your feed pumps?

If you get a low booster pressure alarm, what would you do?

Assume you have wrapped up, would you do anything before you lit off again?

Would you be concerned about purging?

Assume purging has all been completed by the cycle chart but the duty BT says he can see some oil in the firebox - would you let him light off?

What would you do if you had a fire in the air casing?

Ever been inside a main condenser? Can you get inside the steam side?

High water level alarm - What would you expect to see? What is the saturation temperature for 1200 psi? What is the superheater outlet temperature?

Assume electrician trips off a generator. Will the turbine end run down?

M Division Leading CPO

Assume you have a loss of control air. What will happen?

How are SSTGs set up - split or parallel?

Assume an increase in electrical load. Will that increase go on one SSTG or be distributed?

What does the term power factor mean to you? Is a power factor of 1.0 good or bad? Does that mean anything to you?

For an increase in load, would you expect to see voltage go up or amperage go up or both go up?

Assume you are steaming auxiliary normally with four SSTGs with #1 ME on modified main and MMOW wants to dump the hot well - can he do it?

Condensate pump stops but restarts and slugs the DFT with cold water and you get a low booster pressure alarm. What would you do?

Questions asked by CAPT LATHAM during PEB Re-Examination

Assume you wrap up and purge but some oil is left on deck in the firebox. Would you let the BT light off?

Tested out some quick closing boiler stops and water came out of the air lines for the boiler stops. Is this normal? Do you have a dry air system on the ship? Never had one?

A Division MMC

Do you consider yourself qualified to stand supervisory watch? What steps have you taken to get qualified?

What is the condensate system?

As a top watch in central, do you know enough about the boilers to supervise the boilermen?

Ever been inside a boiler?

Do you know what a feed check valve is? Is it automatic? Can a man operate it by himself? Is there a man on watch there? Can the checkman close the feed check valve by himself? Can the console operator close it from the console?

In case of a casualty, can the checkman close the valve manually? Can you do it from Central?

Can you close the boiler stops from the 2nd deck? Can you close the fuel oil supply to the boiler from the 2nd deck?

When you're the supervisory watch, do you worry about the electricians? Are your generators split out or in parallel? When a load surge comes, does the increase in load go on one generator or all? Does the voltage change? Does the amperage increase or decrease?

If voltage drops off, does that mean that amperage falls off also?

Main Engines Officer

Do you feel you know enough about boilers to supervise the Chief Boilerman on watch?

Have you ever been inside a boiler? How bid is it inside a boiler? Could you lay down inside? Can you stand up inside? Is the superheater in the steam drum?

High water casualty. What is going to happen in the plant?

How is the generator secured?

Questions asked by CAPT LATHAM during PEB Re-Examination

Are there lights on in the main spaces when the emergency diesel comes on the line?

If the electrician has to throw a breaker to supply lighting, why not have breaker thrown beforehand?

Assume water just barely got out of sight on a low water casualty. Are you going to tell the BT to go ahead and light off?

BTOW reports oil on deck in the firebox. Will you let him light off?

Fire in boiler casing. Watch wants to go to GQ - would you do it?

Can you bottom blow a steaming boiler? Will this decrease the chloride level of the boiler?

Assume boiler chloride level is up to 5 epm. Would you be worried?

What does the term gland sealing steam mean to you?

Ever been inside a main condenser?

A Division Material Maintenance Officer

What steps have you gone through to qualify as an auxiliary watchstander?

Do you feel you have enough knowledge to supervise the Cheif BTs and Chief MMs on watch?

Do you know what a feed check valve is? Is there a man on watch at the feed check valve? Is he controlling it by hand? Can it be controlled from the EOS?

Have you ever been inside a boiler? Do you know where the superheater is? How about the cyclone separators?

How about the electrical end? Do you steam with generators in parallel or split out?

With an increase in load, would one generator take the load or would it be distributed equally? What would happen to voltage amperage?

With a high water casualty, what would be the consequences?

Who trips the generator? Can the electrician trip the generator? How does the machinist mate trip the generator?

If you lose everything, are people going to be walking around in the dark?

Attachment A to Appendix G provides a list of common recurring PEB material discrepancies.

MATERIAL DISCREPANCIES	AVG. NO. OF DISCREPANCIES		
	(1) DLG	(3) DDG	(2) DE
Valves			
1. Valve handwheels, nuts, lifting levers, or position indicators missing, damaged, or of improper material	33	11	62
2. Valve label plates, tags, or identification missing or unreadable.	98	76	158
3. Valves require cleaning, preservation, or lubrication.	791	79	67
4. Valve packing gland or packing damaged, missing and/or leaking.	31	6	22
5. Valve leaking through.	5	2	7
6. Valve settings wrong or unknown.	11	6	8
7. Valves missing, damaged, inoperative, or inaccessible.	21	7	6
8. Valve extensions, reach rods, or remote operating gear disconnected, inoperative, or missing.	18	5	6
Piping			
1. Flange and lube oil strainer shields missing, damaged oil soaked, or the wrong type.	50	58	20
2. Funnels, covers or caps missing from drain lines or firemains.	23	6	6
3. Identification and direction of flow stenciling missing.	39	5	15
4. Pipe hangers, braces, or supports broken or missing.	78	20	60
5. Vent lines, drain lines, or tail pipes loose, missing, or need preservation.	48	13	16

MATERIAL DISCREPANCIES	AVG. NO. OF DISCREPANCIES (1) DLG	(3) DDG	(2) DE
Piping (contd)			
6. Lagging damaged, deteriorated, or missing.	65	35	20
7. Piping or flex hoses loose, damaged, or deteriorated.	19	19	6
8. Flanges leaking.	1	2	3
Electrical			
1. Lights, switches, lighting fixtures, or shields missing, inoperative, dirty, loose or wrong type.	33	4	15
2. Battle lanterns damaged, missing, loose, or need repairs.	10	5	2
3. I.C. telephones or amplifiers inoperative or need repairs.	2	2	1
4. Batteries dirty; battery rack dirty or needs preservation.	2	1	0
5. Electrical wiring or ground strap frayed, broken, not secured, or dead and not removed.	8	0	13
6. Terminal box loose.	0	0	2
7. Switchboards dirty or need preservation.	2	2	2
8. Rubber matting in front of SWBD worn or missing.	0	1	1
9. ABT not operating properly.	0	1	1
10. Battery charger inoperative.	0	0	1
11. Generator sliring grooved.	0	0	1
12. Volt/ammeter damaged, inoperative, out of calibration, or wrong type.	2	1	2
13. Jack box or cover plates missing.	3	1	4
14. Cable tags missing.	14	4	11

MATERIAL DISCREPANCIES (Cont'd)

	Mechanical	AVG. NO. OF DISCREPANCIES (1) DLG	(3) DDG	(2) DE
1.	Suction screens and strainers dirty, damaged, or missing.	7	3	5
2.	Miscellaneous plugs and chains missing.	12	2	1
3.	Miscellaneous nuts and bolts loose or missing.	24	7	8
4.	Vent screens and filters damaged, dirty, or missing.	20	9	13
5.	Equipment casing lube oil leaks.	6	5	2
6.	Locks, locking devices, safety wires, and lead seals missing or broken.	36	15	10
7.	Dissimilar metals used on equipments, valves, and line flanges.	17	8	11
8.	Coupling guards missing, damaged, wrong type, or require preservation.	10	2	5
9.	Foundations and supports greasy, dirty, and deteriorated.	21	16	23
10.	Equipment not connected or missing and not tagged out.	2	3	3
11.	Rubber shock mounts need cleaning, need paint removed, or are out of date.	3	1	5
12.	Sight glasses and gage glasses broken, dirty, normal level not marked, guards missing, or not properly lighted.	4	5	9
13.	Equipment rotor position indicator not zeroed, damaged, or missing.	2	0	2
14.	Oil in sumps contaminated.	3	0	1
15.	Pumps require repacking.	4	2	3
16.	Pumps damaged.	2	0	0
17.	Lubrication seals leaking.	1	1	3

MATERIAL DISCREPANCIES (Cont'd)	AVG. NO. OF DISCREPANCIES (1) DLG	(3) DDG	(2) DE
Mechanical (Contd)			
18. Automatic shutdown (over speed or high pressure) inoperative or slow.	0	3	2
19. Couplings rusty or missing.	0	2	1
20. Dipstick or vent pipe loose, damaged, missing, or not IAW NAVSHIPS directives.	3	1	3
21. Low lube oil pressure from hand operated LO pump and electric LO pump.	0	1	1
22. Fuel oil leaks.	0	1	1
23. Gland seal regulator leaking.	0	1	1
Instrumentation			
1. Instruments, indicating devices, gages or thermometers broken, loose, deteriorated or missing.	42	29	25
2. Instrument, indicating device, gage, or thermometer wrong type, out of calibration, not identified, or unreadable.	50	40	48
3. Alarm systems inoperative, set incorrectly, or not marked.	4	9	10
4. Flow indicators damaged, disconnected, or missing.	1	0	0
5. Salinity-indicating system inoperative or not calibrated.	0	1	4
6. ACC system set wrong or inoperative.	0	5	8
General			
1. Spaces dirty and gear adrift.	9	7	6
2. Dirt, oil, water, and foreign objects in bilges.	17	12	20
3. Bulkheads, overheads, and cableways need cleaning and preservation.	4	2	4
4. Manifolds need cleaning, preservation, and/or painting.	6	2	2

MATERIAL DISCREPANCIES (Cont'd)	AVG. NO. OF DISCREPANCIES		
General (Contd)	(1) DLG	(3) DDG	(2) DE
5. Instruments require preservation.	3	4	21
6. Unused equipments should be removed.	2	2	2
7. Operating instructions and safety precautions erroneous, obsolete, or missing.	2	3	7
8. CO_2 Battle tags, seals, brackets, and nozzles broken, missing, not up to date, or not secure	10	5	5
9. Warning signs missing.	0	7	4
10. Hand rails broken or missing.	1	2	3
11. Caps and chains missing.	19	6	9
12. Valve glands and bonnets, pipe flanges, and equipment casings short studded.	43	28	26
13. Deck plates, gratings, or non-skids damaged, worn, missing screws, or wrong material.	17	4	11
14. Insulation damaged or missing.	5	4	4
15. Special tools missing.	1	2	1
16. Dissimilar metals used on equipments, valves, and line flanges.	17	8	11

APPENDIX H

ACTIVITIES PROVIDING SERVICES TO FLEET UNITS

1. NSMSES (Naval Ship Missile Systems Engineering Station), Port Hueneme, California

Performs varied engineering functions associated with in-service ship guided missile weapons systems. Assists in achieving the expeditious and successful introduction of ship guided missile weapon systems into the Fleet. Provides technical support to Fleet activities as required.

2. NOSSOPAC (Naval Ordnance Systems Support Office, Pacific)

Provides Fleet support engineering, technical support and material services for ordnance systems in the Fleet. Assists in support of shipboard tests, trials, inspections and engineering reviews on in-service ordnance. Functions as a primary point of contact for operating forces on matters relating to naval ordnance.

3. NOSSOLANT (Naval Ordnance Systems Support Office, Atlantic)

Same as NOSSOPAC, above.

4. NUWSEC (Naval Underwater Weapons System Engineering Center) Newport, RI

Performs in-service engineering for UWS (Underwater Weapons Systems), including torpedos, underwater missiles, fire control, launchers, torpedo tubes and associated equipments. Provides technical assistance to Fleet units to assure combat readiness of in-service UWS.

5. NOS (Naval Ordnance Station), Louisville, KY

Provides service engineering assistance. Provides cognizant field activity support for Intermediate Caliber Gun Mount System integration. Provides primary field technical support for planning, manufacturing and procurement of small boat ordnance.

6. NAD (Naval Ammunition Depot), Earle, NJ

Provides underwater ordnance/missile logistics support to the Fleet.

7. NTS (Naval Torpedo Station), Keyport, WA

Develops, maintains and operates underwater 3-dimensional tracking facilities for undersea warfare systems. Provides technical services to Fleet Units. Conducts West Coast Anti-Submarine Warfare Weapons Systems Accuracy Trials.

8. NWL (Naval Weapons Laboratory), Dahlgren, VA

Provides the shipboard technical support required to prosecute the NAVORD Pointing and Firing Cut-Out Zone.

9. NAVORDSYSCOMHQ (Naval Ordnance Systems Command Headquarters), Washington, DC

Provides the active and reserve operating forces with appropriate guidance and support on technical matters concerning the operation and logistic support for assigned weapons systems, support systems and equipments. Provides Contract Engineering Technical Services (CETS).

10. NAVSEC (Naval Ship Engineering Center), Washington, DC

Provides engineering continuity and integrated logistics support to insure introduction of Fleet-worthy systems to the Fleet. Provides technical assistance as assigned (i. e., shock testing of operational ships). Provide special contract-technical services or "fix" programs on non-fleet worthy equipment in-service.

11. NAVSEC PHILADIV (Naval Ship Engineering Center Field Division, Philadelphia)

Provides close contact with the operating units of the Fleet to assure closer monitoring of Fleet problems and faster response to Fleet needs concerning machinery, electrical and hull equipment.

12. NAVSEC NORDIV (Naval Ship Engineering Center, Field Division, Norfolk)

Provides close contact with the operating units of the Fleet to assure closer monitoring of Fleet problems and faster response to Fleet needs for proper operation and maintenance of electronic equipment.

13. NAVSEC SDIEGO (Naval Ship Engineering Center, Field Division, San Diego)

Provides close contact with the operating units of the Fleet to assure closer monitoring of Fleet problems and faster response to Fleet needs for all types of equipment under NAVSHIPSYSCOM cognizance.

14. NAVSHIPYDs (Naval Shipyards)

Provide logistic support for assigned ships and service craft. Provide services and material to Fleet activities as assigned.

15. NSSNF (Naval Strategic Systems Navigational Facility)

Provides support for MK 2 and MK3 SINS (Ships Inertial Navigational System) and related navigational equipments on SSN's and CVA's.

16. NAVSHIPSYSCOMHQ (Naval Ship Systems Command Headquarters), Washington, DC

Same as NAVORDSYSCOMHQ as above, #9.

17. NESTEF (Naval Electronic Systems Test and Evaluation Facility), Patuxent River

Performs certification and checkout for ACLS (Aircraft Landing Systems) and AIMS/IFF (Air Traffic Control Radar Beacon System Identification Friend or Foe MARK XII Systems).

18. NAVELECSYSCOMHQ (Naval Electronics Systems Command Headquarters, Washington, DC

Same as NAVORDSYSCOMHQ above, #9.

19. NAVELECSYSCOM Field Divisions

Provide liaison and Fleet support for NAVAIR (Navy Air Identification), IFF (Identification Friend or Foe) and other NAVALECSYSCOM cognizance equipment.

20. NARFs (Naval Air Rework Facilities)

Provide engineering and technical services on aircraft maintenance and logistics problems.

21. NAVSHIPSYSCOMGTO WESTPAC (Naval Ship Systems Command Management Office, Western Pacific Area)

Provides management and industrial engineering consultant services to CINCPACFLT in matters involving NAVSHIPSYSCOM technical responsibilities.

22. <u>NAVAIRSYSCOMHQ (Naval Air Systems Command Headquarters), Washington, DC</u>

Same as NAVORDSYSCOM above, #9.

23. <u>NWS (Naval Weapons Station), Charleston, SC</u>

Provides ordnance logistics backup support for Fleet tenders.

24. <u>NWS (Naval Weapons Station), Yorktown, VA</u>

Provides recovery services for local mine-laying operations. Provides logistic service and support related to routine and emergency Fleet requirements of classified ordnance/weapons and related components.

25. <u>NAD (Naval Ammunition Depot), McAlester, OK</u>

Conducts and/or participates in technical investigations and logistic evaluations of classified ordnance/weapons. Performs maintenance engineering and in-service engineering on weapons assigned.

26. <u>NAD (Naval Ammunition Depot), Crane, IN</u>

Furnishes engineering and technical services. Provides Fleet engineering and maintenance on components, sub-assemblies and spare parts, as directed. Acts as Technical Support Agent and In-Service Engineering Agent for all small arms, small arm mounts, night vision device mounts, flame weapons systems and body armor.

27. <u>MOTU (Mobile Technical Unit)</u>

MOTUs, sponsored by NAVORDSYSCOM/NAVSHIPSYSCOM and commanded by fleet units, and composed of military/contract personnel, provide electronic and ordnance system support to the fleet.

APPENDIX I

DEFINITIONS

1. Equipment Maintenance: The function of sustaining material in an operational status, restoring it to a serviceable condition or updating and upgrading its functional utility through modification.

2. Equipment Maintenance Management: The process of developing the workload requirements forecast and planning, organizing, staffing, directing and controlling the engineering, industrial and other resources necessary to effectively and economically support the equipment operational objectives of the Military Departments and the Office of the Secretary of Defense.

3. Maintenance Engineering: That activity of equipment maintenance which develops concepts, criteria and technical requirements during the conceptual and acquisition phases to be applied and maintained in a current status during the operational phase to assure timely, adequate and economic maintenance support of weapons and equipments.

4. Maintenance Engineering Management: The process of planning, organizing, staffing, directing and controlling those maintenance resources engaged in the engineering and technical support of equipment maintenance.

5. Maintenance Production: That activity of equipment maintenance which involves the physical performance of those actions and tasks attendant to the equipment maintenance function for servicing, repairing, testing, overhaul, modification, calibration, modernization, conversion, inspection, etc. The accomplishment of these tasks is normally carried out at three levels comprised of organizational, intermediate and depot maintenance.

6. Maintenance Production Management: The process of planning, organizing, staffing, directing, and controlling organic industrial resources engaged in the physical performance of equipment maintenance.

7. Maintenance Resources: Consist of personnel, materials, tools and equipment, facilities, technical data, and dollars provided to carry out the equipment maintenance mission.

8. Equipment Performance Data: Consists of historical information relating to maintainability, reliability and supportability characteristics of systems, subsystems and components of weapons and end item equipments during their operational application.

9. Maintenance Performance Data: Relates to the use and application of the workforce, industrial equipment and dollars to sustain weapons and end item equipments in an operational status.

10. Maintenance Capability: Availability of those resources; namely facilities, tools, test equipment drawings, technical publications, trained maintenance personnel, engineering support and availability of spare parts, required to carry out maintenance.

11. Maintenance Capacity: A quantitative measure of maintenance capability usually expressed as the amount of direct labor man-hours that can be applied within a specific industrial shop, or other entity, during a forty-hour week (one shift - five days).

12. Organizational Maintenance: That maintenance which is the responsibility of and performed by a using organization on its assigned equipment. Its phases normally consist of inspecting, servicing, lubricating, adjusting, and the replacement of parts, minor assemblies and sub-assemblies.

13. Intermediate Maintenance: That maintenance which is the responsibility of and performed by designated maintenance activities for support using organizations. Its phases normally consist of calibration, repair or replacement of damaged or unserviceable parts, components or assemblies; the manufacture of critical non-available parts; and providing technical assistance to using organizations. Intermediate Maintenance is normally accomplished in fixed or mobile shops, tenders, or shore based repair facilities, or by mobile teams.

14. Depot Maintenance: That maintenance which is the responsibility of and performed by designated maintenance activities, to augment stocks of serviceable material, and to support Organizational Maintenance and Intermediate Maintenance activities by the use of more extensive shop facilities, equipment and personnel of higher technical skill than are available at the lower levels of maintenance. Its phases normally consist of inspection, test, repair, modification, alteration, modernization, conversion, overhaul, reclamation, or rebuild of parts, assemblies, sub-assemblies, components, equipment end items, and weapon systems; the manufacture of critical non-available parts; and providing technical assistance to intermediate maintenance organizations, using and other activities. Depot Maintenance

is normally accomplished in fixed shops, shipyards and other shore based facilities, or by depot field teams.

15. Interservice Maintenance Support: Maintenance, either recurring or non-recurring, performed by the organic capability of one military service or element thereof in support of another military service or element thereof.

16. Organic Maintenance: That maintenance performed by a Military Department under military control utilizing government-owned or controlled facilities, tools, test equipment, spares, repair parts, and military or civilian personnel.

17. Contract Maintenance: Any maintenance performed under contract by commercial organizations (including original manufacturers).

18. Weapon System: A final combination of subsystems, components, parts and materials which make up an entity utilized in combat, either offensively or defensively, to destroy, injure, defeat, or threaten the enemy, e.g., F-4 aircraft, FBM submarine, frigate, HAWK missile installation, Huey Cobra Helicopter.

19. Equipment End Item: An equipment end item is defined as an instrument of combat or combat support employed in the accomplishment of military missions. It consists of a final combination of assemblies, parts, and materials which together perform a complete operational function and is ready for its intended use, i.e., vehicle, missile, aircraft, ship, tank, communication system.

20. Subsystem: A subsystem is a major functional part of a weapon or equipment end item usually consisting of several components, that is essentially operationally complete within the system. Examples are ARC-34 VHF or interphone of a communication system, DC and AC power supply of an electric system.

21. Component: A component is an assemblage or any combination of parts, sub-assemblies and assemblies mounted together, normally capable of independent operation in a variety of situations. Examples are: Receiver/Transmitter of an ARC-34 VHF Subsystem; relay of a DC or AC power supply Subsystem, Tank Transmission, Helicopter Gear Box.

22. Commodity Groups: A grouping or range of items which possess similar characteristics, have similar applications, or are susceptible to similar logistic management methods.

23. Materiel: Consists of all tangible items (including ships, tanks, self-propelled weapons, aircraft, etc., and related spares, repair parts and support equipment; but excluding real property, installations, and utilities) necessary to equip, operate; maintain and support military activities without distinction as to its application for administrative or combat purposes.

24. Mission-Essential Materiel: a. That materiel which is authorized and available to combat, combat support, combat service support, and combat readiness training forces to accomplish their assigned mission. b. For the purpose of sizing organic industrial facilities, that Service-designated materiel authorized to combat, combat support, combat service support, and combat readiness training forces and activities, including Reserve and National Guard activities, which is required to support approved emergency and/or war plans, and where the materiel is used to: (1) destroy the enemy or his capacity to continue war; (2) provide battlefield protection of personnel; (3) communicate under war conditions; (4) detect, locate, or maintain surveillance over the enemy; (5) provide combat transportation and support of men and materiel; and (6) support training functions; but is suitable for employment under emergency plans to meet purposes enumerated above.

LIST OF ACRONYMS

ACC	Automatic Combination Control
ACO	Administrative Contracting Officer
ACT	Active or Activity
ADMIN	Administrative
ADP	Automated Data Processing
AEL	Allowance Equipage List
AER	Alteration Equivalent to a Repair
AERP	Advanced Equipment Repair
ALT	Alteration
AMS	Alteration Management Summary
AMP	Amalgamated MIP/TIP
APA	Appropriation Purchase Account
APF	Annual Planning Figure
APL	Allowance Parts List
ASF	Assist Ships Force (fund)
ASI	(1) Annual Safety Inspection
	(2) Annual Supply Inspection
ASST	Assistant or Assist
ASPR	Armed Services Procurement Regulations
AT	(1) Action Taken
	(2) Acceptance Trial
ATR	Alteration Test Requirement

AVL AVLBTY	Availability
AWC	(1) Accomplishing Work Center
	(2) Assist Work Center
AWR	(1) Automated Work Request
	(2) Alteration Work Request

B

BACD	Basic Alteration Class Drawings
BAT	Boiler Appraisal Team
BKLOG	Back log
BOA	Basic Order Agreement
BOH	Baseline Overhaul
BPA	Blanket Purchase Agreement

C

CAO	Contract Administration Office
CAR	Conversion, alteration and repair
C	Completed
CASREPTS	Casualty Report
CAUSE	Cause of failure code
C&F	Cost and feasibility
CFE	Contractor Furnished Material
CID	Component Identification Designation
CIP	Class Improvement Plan
CM	Corrective Maintenance
CNM	Chief of Naval Material

CNT	Chief of Naval Training
COAR	Customer Order
COG	Cognizance
COH	Complex Overhaul
COMPL	Completion or Completed
COND	Condition
COSAL	Coordinated Shipboard Allowance List
COT	Consolidated Operability Test
CPAF	Cost-Plus-Award Fee
CPFF	Cost-Plus Fixed Fee
CPIF	Cost-Plus Incentive Fee
CPM	(1) Corrective Maintenance Discovered During Preventive Maintenance
	(2) Critical Path Method
CRUDES	Cruisers/Destroyers
CSMP	Current Ship's Maintenance Program
CSOT	Combat Systems Operability Test
CSRT	Combat Systems Readiness Test
CTRL	Control

D

DART	Detection Action Response Technique
DATC	Development and Training Center
DAT	Distillate Advisory Team
DCAS	Defense Contract Administration Service

DCASR	Defense Contract Administration Service Region
D/DAT	Desired Completion Date
DDC	Defense Documentation Center
DDEOC	Destroyer Engineered Operating Cycle
DEF	Deferred
DEPOT	Shipyard Maintenance Activity
D/HRS	Documented Manhours
DIS	Disposition
DISC	Discrepancy Identification System
DMH	Direct Labor Man Hours
DMI	Direct Material Inventory
DOCS	Documents
DOD	Department of Defense
DSA	Defense Supply Agency

E

EAL	Equipment Application List
EAM	Electronic Accounting Machine
E/C	Equipment Condition
ECP	Engineering Change Proposal
EDORM	Engineering Department Organization and Regulation Manual
EDP	Electronic Data Processing
EGL	Equipment Guide List
E/HRS	Estimated Manhours

EIC	Equipment Identification Code
EOCC	Engineering Operational Casualty Control
EOSS	Engineering Operational Sequencing System
EDPO	Enlisted Personnel Distribution Office
EQUIP	Equipment
ESO	Electronics Supply Office
EST	Estimated
ETA	(1) Exception Time Accounting
	(2) Estimated Time of Arrival

F

FA	Forces Afloat
FAT	(1) Final Action Taken
	(2) Final Acceptance Trials
FBR	Feedback Report
FCN	Financial Control Number
FEWSG	Fleet Electronic Warfare Support Group
FIIN	Federal Item Identification Number
FILL	Fleet Issue Load List
FILS	Fleet Improved Logistics Support
FIT	(1) First Indication of Trouble
	(2) Fleet Introduction Team
FMAG	Fleet Maintenance Assistance Group
FMP	Fleet Modernization Program
FMSO	Fleet Maintenance Support Office

FOA	Fitting Out Availability
FOCSL	Fleet Oriented Consolidated Stock List
FPI	Fixed-Price Incentive
FPIF	Fixed Price Firm
FPIS	Fixed Price Successive
FPR	Failed Part Required
F PT COND	Failed Part Condition
FSC	Federal Stock Class
FSCM	Federal Supply Code for Manufacturer
FSMO	Fleet Maintenance Support Office
FSN	Federal Stock Number
FSS	Federal Supply Service
FY	Fiscal Year
FYDP	Five Year Defense Plan

G

GAO	Government Accounting Office
GFE	Government Furnished Equipment
GFM	Government Furnished Material
GOR	General Operating Requirement
GPETE	General Purpose Electronic Test Equipment
GSA	General Services Administration

H

HABIT	Habitability Items
HIVAC	High Valve Asset Control

HME	Hull/Machinery/Electrical

I

ICN	Industrial Control Number
ICP	Inventory Control Point
ID	Identification
IDD	Interim Drydocking
IF	Industrial Fund
I/I	Initial Installation
ILS	Integrated Logistics Support
IMA	Intermediate Maintenance Activity
IMC	Integrated Management Center
IMMP	Integrated Maintenance and Modernization Planning
IMMS	Intermediate Maintenance Activity Maintenance Management System
INIT A/T	Initial Action Taken
INSERV	Board of Inspection and Survey
IOH	Interim Overhaul
IPE	Industrial Plant Equipment
ISE	Independent Ship Exercises
ISIC	Immediate Superior in the Chain(of Command)
ITP	Integrated Test Plan
IUC	Intermediate Unit Commander

J

JCN	Job Control Number
JO	Job Order
JO/KO	Job Order/Key Operation
JSN	Job Sequence Number
JML	Job Material List
JSCP	Joint Strategic Capabilities Plan
JSOP	Joint Strategic Objectives Plan

K

KeyOPS	Key Operations
KPA	Key Punch Activity

L

LDA	Lowest Designated Assembly
LID	Library Issue Document
LLPG	Logistics Planning and Programming Guidance
LLT	Long Lead Time
LLTM	Long Lead Time Material
LOE	Light Off Exam
LOEP	List of Effective Pages
LOGSAT	Logistics Special Assistance Team
LOI	Letter of Instruction
LRPS	Long Range Planning System
LWC	Lead Work Center

M

MCA	Machinery Condition Analysis
MCC	Maintenance Control Center
3-M	Ship's Navy Maintenance and Material Management
MAINT	Maint enance
MAP	(1) Maintenance Action Plan
	(2) Military Assistance Program
MCB	Maintenance Control Board
MCR	Maintenance Control Report
MDCC	Maintenance Data Collection Center
MDCS	Maintenance Data Collection Sub-System
MEA	Maintenance Engineering Analysis
MFG/MFR/ MFGR	Manufacturer
M/H	Manhours
MHR	Material History Report
MILCON	Military Construction
MIL-STD	Military Standard
MILSTRIP	Military Standard Requisitioning and Issue Procedures
MIP	(1) Maintenance Index Page
	(2) Military Improvement Program
MIS	Management Information System
MISCELL	Miscellaneous Items
MIT	Master Instruction Tape
MOTU	Mobile Technique Unit

MR	(1) Maintenance Requirement
	(2) Material Requisition
MCR	Maintenance Requirement Card
MCRL	Master Cross Reference List
MRIL	Master Repairable Item List
MRS	Maintenance Requirement Substantiated
MRND	Maintenance Requirement Not Developed
MSO	Maintenance Support Office
MSR	Master Ship Repair (Contract)
MTBF	Mean Time Between Failure
MTBPR	Mean Time Between Part Replacements
MTR	Meter
MTT	Mobile Training Team
MTTR	Mean Time to Restore
MYR	Mid-Year Review

N

N/A	Not Available/Applicable
NAVCOSSACT	Naval Command System Support Activity
NAVELEX	Naval Electronics System Command
NAVFAC	Naval Facilities Engineering Command
NAVMMAC	Navy Manpower and Material Analysis Center
NAVMAT	Naval Material
NRF	(1) Naval Repair Facilities
	(2) Naval Reserve Force

NDT	Non Destructive Test
NAVSEA	Naval Sea Systems Command
NAVSEC	Naval Ship Engineering Center
NC	Not Carried
NEC	Navy Enlisted Classification
NIF	Navy Industrial Fund
NIR	No Individual Requirements
NIS	Not in Stock
NI/SS	New Issue/Super
NOA	New Obligational Authority
NON	Notice of Non-Conformance
NMMFO	Navy Maintenance Management Field Office
NMR	No Maintenance Requirement
NMSE	Navy Material Support Establishment
NON-SIM	Non-Selected Item Management
NOIDENT	No Identification Number
NOSSO	Naval Ordnance System Support Office
NPPS	Navy Printing and Publication Service
NRF	Naval Reserve Forces
NRT	Naval Reserve Training
NSA	Naval Stock Account
NSY	Naval Shipyard
NSWSES	Naval Ship Weapon System Engineering Station
NTDS	Naval Tactical Data System

NTPI	Navy Technical Proficiency Inspection
NWAI	Nuclear Weapons Acceptance Inspection
NWAT	Nuclear Weapons Acceptance Team

O

OAR	ORDALT Accomplishment Requirement
OFSE	Operating Forces Support Equipment
OMA	Organizational Maintenance Activity
OMB	Office of Management and Budget
O&MN	Operation and Maintenance, Navy
O&MNR	Operation and Maintenance NRF Ships
OPN	Other Procurement, Navy
OPNAV	Office of the Chief of Naval Operations
OPPE	Operational Propulsion Plant Examination
OPTAR	Operating Target
ORDALT	Ordnance Alteration
ORG	Organization
ORI	Operational Readiness Inspection
LSD	Office of Secretary of Defense
OSI	Operating Spare Item
OTP	Overhaul Test Program
OVHLYD	Overhaul Yard

P

PAO	Primary Action Officer
PC	Production Control

PCA	Post Construction (Conversion) Availability
PCO	Procurement Contracting Officer
PDA	Post Delivery Availability
PDM	Planned Direct Material
PEB	Pre-Expended Bin
PEB/LOE	Propulsion Examination Board/Light-Off Examination
P&E	Planning and Estimating
PECI	Preliminary Equipment Component Index
PERA	Planning & Engineering for Repairs and Alterations
	(SS) Submarines, Portsmouth NSYD
	(CV) Aircraft Carriers, etc. Puget Sound NSYD
	(CRUDES) Cruisers/Destroyers, Philadelphia NSYD
	(CSS) Combat Support Ships, NAVSHIPS Industrial Support Office (NISO) San Francisco
	(ASC) Amphibious Ships & Craft, Norfolk NSYD
PERA DES AGT	PERA Design Agent
PERA PLNG AGT	PERA Planning Agent
PERA PROC AGT	PERA Procurement Agent
PERT	Project Evaluation Review Technique
RM&A	Reliability, Maintainability and Availability
PM	Preventive Maintenance/Program Manager

PMD	Predicted Monthly Demand
PMDO	Planned Maintenance During Overhaul
PMI	Proposed Military Improvement
PMS	Planned Maintenance Sub-System
POA & M	Plan of Action and Milestones
POM	Program Objectives Memorandum
POST	Post Overhaul Sonar Test
PM	Preventive Maintenance
POM	Program Objectives Memorandum
POT&I	Pre-Overhaul Test & Inspection
P&P	Plans and Programs
PQS	Personnel Qualification Standard
PR	Production Report
PRI	Priority
PRCT	Pool Repair Cycle Time
PRT	Post Repair Trials
PSA	Post Shakedown Availability
PTI	Proposed Technical Improvement
PUBSAT	Publications Special Assistance Team
PWC	Primary Work Center
PY	Prior Year

Q

QA	Quality Assurance
QC	Quality Control

QFR	Quarterly Force Revision
QRC	Quick Reaction Capability
QTY	Quantity

R

RAUIC	Repair Activity Unit Identification Code
RAV	Restricted Availability
RDC	Rapid Development Capability
RDD	Required Delivery Date
REF SYM	Reference Symbol
REFTRA	Refresher Training
RFI	Ready for Issue
RFP	Request for Proposal
RFS	Ready for Sea
RFT	Refit
RIR	Repair Inspection Record
RMC	Returnable Media Card
ROH	Regular Overhaul
ROV	Repair of Other Vessels
RWC	Requesting Work Center
RWR	Repair Work Requirement

S

SACS	Ship Alteration Completion System
SACVAR	Ship Alteration Cost Variance Report
SAD	Supplemental Alteration Drawings

SAIL	Ships Armament Inventory List
SAMIS	Ship Alteration Management Information System
SAP	Ship Alteration Package/Program
SARP	Ship Alteration and Repair Package
SAT	System Acceptance Test
SCB	Ship Characteristics Board
SCN	Ship Construction, Navy
SDAT	Start Date
SECAS	Ships Equipment (Electronic) Configuration and Accounting System
SERV	Service
SFOMS	Ship's Force Overhaul Management System
SFWP	Ship's Force Work Package
SHAPM	Ship Acquisition Project Manager
SHIPALT	Ship Alteration
SF	(1) Ship's Force
	(2) Stock Fund
SHIPHABGRP	Ship Habitability Group
SHIPSUP	Ship Superintendent
SIB	Ship Information Book
SIG	Ship Improvement Guide or Signature
SIM	Selected Item Management
SIMA	Shore Intermediate Maintenance Activity
SITREP	Situation Report
SLD	Ship Logistic Division (NAVSEASYSCOM)

SLM	Ship's Logistic Manager
SM	Small Arms
SMD	Ship Manning Document
SMIP	Ships' 3-M Improvement Program
SMMP	Ship Maintenance and Modernization Program
SMO	Ship Management Officer
SMS	Surface Missile System
SNAB	Stock Number Action Bulletin
SNIT	Stock Number Identification Table
SOAP	Supply Operations (Overhaul) Assistance Program
SOR	Specific Operational Requirement
SORM	Ship Organization and Regulation Manual
SOS	Supervisor of Shipbuilding
SPALT	Special Projects Alteration
SPECOMALT	Special Communications Alteration
SPCC	Ships Parts Control Center
SQT	Ship Qualification Trials
SRA	Selected Restricted Availability
SRF	Ship Repair Facility
SRCM	Ship Repair Contracting Manual
SRD	Selected Record Drawings
SSC	Supply Support Center
SSDI	Ships Systems Definition and Index
SSWD	Ship System Work Description

STAT	Status of Equipment Code
STEP	Ship Type Electronic Plan
STERF	Special Test Equipment Repair Facility
SUPSHIPS	Supervisor of Shipbuilding
SWLIN	System Work List Item Number
SWR	Supplemental Work Requests
SYMOD	Shipyard Modernization
SYMP	Symptom
SYSCOM	System Command

T

T	Trouble-Shooting Time
TA	Type Availability
TAB	Training Aid Booklet
TAD	Temporary Additional Duty
TAV	Technical Availability
TBL-ISL	Trouble Isolation Time
TDI	Technical Documentation Indices
TDR	Tender
TDY	Temporary Duty
T&I	Test and Inspection
TIP	Technical Improvement Program (Plan)
TM	Technical Manual
TOA	Total Obligational Authority

TPOM	Tentative Program Objective Memorandum
TRS	Technical Repair Standard
TSI	Technical Standardization Inspection
TSMC	Technical Supply Management Code
TSTP	Total Ship Test Program
TYCOM	Type Commander

U

UD	Update
U/I	Unit of Issue
UIC	Unit Identification Code
UDM	Un-Allocated Direct Material
USC	United States Code

W

WBS	Work Breakdown Structure
WC	Work Center
WD	When Discovered Code
WDC	Work Definition Conference
WLI	Work List Item
WLP&C	Work Load Planning and Control
WOJO	Work-Oriented Job Order (System)
WR	Work Request
WSAT	Weapon System Accuracy Trials
WSR	Weapons System Review

INITIAL DISTRIBUTION LIST

		No. Copies
1.	Defense Documentation Center Cameron Station Alexandria, Virginia 22314	2
2.	Library, Code 0212 Naval Postgraduate School Monterey, California 93940	2
3.	Department Chairman Department of Administrative Sciences Naval Postgraduate School Monterey, California 93940	1
4.	Assoc. Professor M. G. Sovereign Department of Operations Research Naval Postgraduate School Monterey, California 93940	1
5.	PERA (CRUDES) Code 1800 Naval Shipyard Philadelphia Bldg. 76 Philadelphia, PA 19112	2
6.	Mr. Dale Schrader, Code 210 Naval Shipyard Philadelphia Bldg. 11 Philadelphia, PA 19112	1
7.	LT M. E. House, USN Code 330 Naval Shipyard Charleston Charleston, S.C.	2
8.	Adm. C. R. Bryan 12E10 National Center 2 2531 Jeff Davis Hiway Arlington, VA 20362	1
9.	CDR P. F. Sieberking OP-96-4C 4A538 Pentagon Washington, D.C. 20350	1

10. Capt J. E. Rasmussen 1
1W68 National Center #2
2521 Jeff Davis Hiway
Arlington, VA 20360

11. CDR R. L. Warters 1
Curricula Officer, Code 34
Naval Postgraduate School
Monterey, CA 93940

Thesis 166839
H819 House
c.1 A normative view of the pre-overhaul planning process.